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ALTHOUGH the past year has not been one in which railway companies found it particularly easy to sell securities at profitable prices, nevertheless there is a notable indication from the annual reports that have so far been published that there has been a tendency to greatly strengthen the cash assets of railways. For instance, the New York, New Haven & Hartford had $28,160,000 cash on hand on June 30, 1911, as compared with $18,000,000 at the end of 1910; the Lehigh Valley had $20,620,000 cash at the end of 1911, as compared with $10,920,000 at the end of 1910; the Atchison, Topeka & Santa Fe had $28,320,000 cash in treasury and check deposits, as against $23,060,000 the year before; the Illinois Central had $15,140,000, as against $2,200,000 the year before; the Chicago, Milwaukee & St. Paul had $13,580,000, as against $5,540,000. In particular instances it may be true that these large cash balances are the result of the sale of securities in the past year, but in general it is the result of a curtailment in extension and in betterment work. The transportation plant has not been extended, probably because the concensus of opinion of railway managers is that the prospects for increased new business are not good.

A RAILWAY stockholder, Mr. A., recently found pretty conclusive proofs of stealing on one line of the system in the shape of the delivery to one of the superintending employees of supplies presumably owned by the company. He mentioned the suspicious facts to another stock owner, Mr. B., who asked Mr. A. for the name and residence of the employee for the purpose of bringing the facts to the attention of higher officers of the company. Mr. A. curtly refused, alleging it was no part of his business to play detective and intimating—though offering no proofs—that it was but part of a larger system of theft higher up, responsibility for which rested on the corporation, and it is highly probable that Mr. A. has used his text case industriously to point out the corporation's "inefficiency." A year or so ago we cited a different case in its detail and with a different outcome. In that instance an aggrieved passenger was the double victim of an insolent conductor and of an engineman who, contrary to the schedule, ran by the passenger's flag station. The passenger promptly carried his complaint to the powers above, who not only disciplined the conductor and engineman, but thanked the passenger. The two cases we have cited differ in description, but are identical in their moral. Can a railway company put a detective on every train and at the home of every section hand? And, if it cannot, where can a certain large degree of responsibility rest save on the passenger who suffers and sees the wrong? If an ordinary passenger defaults in such a case, what is to be said of the attitude of a man who is a stockholder also and whose personal loss is added to a grievance. It is another example of that big group of folks who are as prompt to condemn the railway as they are slow to recognize the principle of co-operation with it, and who are more fertile in utterance than in action.

IN its relation to railway interests, the legislature of Connecticut, which has just adjourned after a prolonged session of almost nine months, had two noteworthy features. The upper house of 35 senators, traditionally the stronghold of corporation interests, including those of railways, reversed precedent and was almost radically an anti-railway body; the lower house of 258 members was relatively conservative, not only holding up for a time the pretty drastic measure for a new public utilties commission, but defeating by a large majority a radical employer's liability bill which had passed the senate. This reversal of the temper of the two houses was partly the outcome of a popular anti-corporation movement in the state last year, affecting the party nominations to the senate, and partly the result of the fears of party leaders that further delay in passing a public utilities measure—already hung up for six years—would cause a popular revolt. Thus politics had its familiar influence on a question essentially economic. Of direct

railway legislation, not much was enacted; but in the new public utilities act there are many provisions bearing on the railways, including the singular and radical "recall" feature and the power, novel in Connecticut, given the commission to regulate rates. This vast proviso may yet wreck the whole act, as high legal authorities in the state have held that while, under the Connecticut constitution, the legislature can regulate rates directly, it cannot delegate the power. The first test case will soon come up in the state courts. Should the unconstitutionality of the new law be upheld, on appeal, a curious sequel will be a reversion to the old railway commission, with exactly the same personnel and, of course, yet another anti-corporation campaign. The example of Connecticut joined with that of other New England states indicates that the anti-corporate temper of the region is not so very far behind that of any other part of the country, though, happily for the railways, less vigorous and severe in action.

RECENTLY several letters have appeared in the Chicago newspapers from persons who complained that they have been unable to get satisfactory taxicab service from the passenger stations in that city. It is regrettable that the complaints on this subject are justifiable. The Frank Parmelee Company long has been given a monopoly of the solicitation of baggage and carriage business on trains entering Chicago and in the passenger stations in that city. Formerly it provided only a horse cab and a horse coach service for the carriage of passengers. There sprang up a demand for an arrangement under which passengers could order taxicabs at some desk in each station. A competing carriage and baggage company a short time ago offered to furnish this service. It was then announced that the Parmelee company would provide a taxicab service, and the offer of the competing concern was rejected. When the Parmelee company's service was established it proved to be not a taxicab service, to be paid for at the mileage rates fixed by ordinance in Chicago, but a motor car service, the rates for which within a limited radius are reasonable, but which increase so fast with distance that for any considerable distance they are very much higher than the taxicab rates. For example, to one residence in the city where the taxicab rate from the union station is $3.30 the Parmelee company on one and the same day asked one passenger $4, and another $4.75. When complaints are made to the Parmelee company its answer is that it furnishes a horse cab and a motor car service, but does no taxicab business. Now, the Parmelee company has a perfect right to refrain from doing a taxicab business if it likes. The situation of the railways is very different. They have no moral right to deny to their patrons the opportunity to engage taxicabs in their stations when this can be done without interfering with railway service in any way or encroaching on the rights of anybody. The present condition is indefensible, and exists in disregard of the recommendations of passenger officers who have fully investigated the matter. One reason that has been given for not allowing a taxicab service to be provided from the stations has been that this line of business has been unprofitable in Chicago. Such solicitude on the part of the railways for the taxicab companies' financial welfare is more gratuitous than business-like. People can get taxicabs by telephoning to hotels and other outside places and having them sent to the railway stations; and since the companies can afford to furnish them when they are not secured from desks in the stations, they could afford to furnish them at the same rates if secured from desks within the stations. The railways are amply justified in giving a monopoly of the solicitation of carriage and baggage business on their trains and in their stations to a single company; but to give it to one that will not render a complete and satisfactory carriage and baggage service, when others stand willing to do so, is a good way to invite criticism which even the best friends of the roads must admit to be just, and which, while it may not harm the Parmelee company, does harm the railways.

THE STRIKE OF SHOP EMPLOYEES.

IT was not the unexpected that happened when the officers of the federations of shop employees of the Harriman Lines and the Illinois Central last week ordered their members to strike. By their demands, and especially by their way of making them, the leaders of these organizations had committed themselves so far that when the railway managers refused to grant anything that they asked for they had no choice except either to order a strike or to ignominiously back down and suffer incurable loss of prestige.

That the stand the railway managers have taken is right is conceded, we think, by almost all fair-minded persons who know the facts. The leaders of the strikers complain that the attitude of the managers was arbitrary. They say that the employees have a right to determine through what organizations they shall deal with the railways; that this right was denied when the managers refused to recognize the federation, and that this is the sole cause of the rupture. But, as Mr. Kruttschnitt and Mr. Markham have pointed out, the railways perform a public service, and it is the duty of their officers to take all reasonable precautions to prevent interruption of that service. For them to enter into contracts with federations of all their employees, or even of all their shop employees, they have contended, would put into the possession of the latter the power to stop the railway's service. From this reasoning it follows that the managers could not at once do their duty to the public and recognize the federations.

However, it is not true that the refusal of recognition of the federations was the sole cause of the strikes. The federations had formulated numerous demands which they proposed to make on the railways and which they undoubtedly would have pressed immediately if they had been recognized. These demands included reductions in hours of work; increases in pay; abolition of the requirements regarding physical examination of, and the furnishing of personal records by candidates for employment; the closed shop, the abolition of the piece, premium and bonus methods of compensation where they exist and their non-establishment where they do not obtain, etc. When the railway managers refused to recognize the federations they were largely influenced by the fact that they saw these other demands in the background, and perceived that if they did recognize the federations, they would thereby greatly increase the power of the unions and render themselves much less able to resist these other demands; and when the employees struck, they did so not so much because their federations were not recognized, as because they saw that only after compelling such recognition could they hope to coerce the railway managers into granting their unreasonable demands regarding wages and conditions of employment.

The managers of the Harriman lines and the Illinois Central are fighting the battles both of their stockholders and of the public. It has not been uncommon in the past for railway managers who had the courage to do this to incur the displeasure of their stockholders, their directors and the public, not because they did not so perform their duty as, in the long run, to benefit both, but because they incurred the cost necessarily incident to the performance of that duty. The directors saw that the strike reduced net earnings, and they forgot that this temporary reduction of net earnings was necessary to safeguard net earnings permanently. The public saw that the service of the railways was more or less interfered with, and it gave more attention to this than to the fact that the temporary interference was necessary to maintain or secure conditions under which the service could permanently be rendered with a maximum of efficiency and a minimum of cost. The principal stockholders, the directors of the lines involved and the public probably have a better understanding of what is involved in this struggle than has usually been the case. Victory for the strikers would mean unreasonable conditions of employment, unreasonable advances in wages, and a dangerous addition to the power of the leaders of the unions. Victory for the railways will mean that those

chosen to manage them and held responsible for their management by both the owners and the public, will be allowed to continue to manage them. It probably will not mean lower wages or worse conditions of employment, but it may—and let us hope that it will—mean a practical recognition of the fact that railways have the same right as other industries, and, because of the public nature of their service, a much clearer duty to so adjust the compensation of their employees and to so fix their conditions of employment as to conduct their operations with reasnable efficiency and economy.

The strike comes at a time that is peculiarly favorable to the roads. Many men are out of employment who are glad to take the places of those who have quit. The equipment of the railways involved is in good repair, and there is a good deal of it out of service which can be put into service as fast as that in use needs repair. Prompted by consideration of their own self-interest, as well as by loyalty to the roads, many of those ordered to quit work have refused. The indications are, therefore, that the losses that will be incurred by railway corporations and the inconvenience that will be suffered by the public will for a considerable time, at least be small, and that if the managers are properly backed up by those whose battles they are fighting, the strike will be a failure, a result which will be good for the railways, good for the public and, in the long run, good for the employees themselves.

THE RAIL SITUATION.

THE seriousness of the rail situation is emphasized by the wreck on the Lehigh Valley near Manchester, N. Y., which the New York Public Service Commission found was caused by the failure of a rail which was piped and which also had a defective base. The Oriental Limited on the Chicago, Burlington & Quincy was wrecked about a year and a half ago by a similar rail failure, and numerous other accidents of less serious nature have occurred recently. Reports for the year ending October 31, 1910, showed 35,843 rail failures for 11,691,302 tons of rail laid, including only rail weighing more than 70 lbs. per yard, and the character of these failures indicates that nearly all were due to defective material.

Up to a few years ago rail failures were of such unusual occurrence that they did not attract serious attention, but with the use of rails weighing more than 80 lbs. to the yard made necessary by the use of heavier locomotives, serious trouble was experienced with rail failure. These failures were due to either physical defects or inferior chemical composition, as shown by the fact that under the same locomotives running at the same speeds the heavier sections had a higher percentage of defective rails than the old lighter sections. In 1907 the matter had reached such a stage that the railways of the country were seriously alarmed and the American Railway Association began a campaign for better rails. Meetings of the rail committee of this association were held at various times, at which the matter was thoroughly discussed, statistical data presented, and the whole subject studied. A committee representing the manufacturers was called in consultation to obtain the manufacturers' idea as to the causes of defective rails, and at this conference it was decided that the existing section was not well adapted to rolling, the proportions of the metal in the head and base being such as to give different temperatures throughout the rail. After a great deal of work and study, new specifications were prepared, a new set of rail sections designed and adopted, and forms for keeping statistics of rail failures prepared. In addition to the change in sections, the following changes in manufacture were considered necessary to secure a better rail:

1. Greater discard from the top of the ingot.
2. Lower phosphoros content and a better proportioning of the other elements.
3. More and higher drop tests.
4. More careful mill practice.
5. More severe and uniform inspection.

These changes in manufacture were strongly objected to by rail manufacturers, as were all changes which had a tendency to decrease the tonnage of the mills. When it was attempted to buy rails under the proposed specifications the manufacturers demanded what railway men considered extortionate prices for any improvement which interfered with existing mill practice. For example, the full price of the finished rail was asked for any additional discard, making it just as cheap for the railway company to buy all rails from the ingot and throw away the top rail. Higher drop tests were refused and a high price was asked for any additional tests.

After a number of concessions on the part of both the railways and manufacturers, a set of specifications was adopted, which has been in use the last three years. The quality of rails has probably improved during this time, but it is evident that the need for further improvement is still great. A number of roads have become so much dissatisfied with the results secured from Bessemer rails that they are paying a premium for open hearth rails of special quality and alloy steel of several types. The rail which caused the Lehigh Valley wreck was an open hearth rail, having 20 per cent. discard, the discard in excess of 9 per cent. being secured at a premium. The increased use of alloy steels for rails is clearly shown by the increased tonnage of such rails rolled during 1910, as mentioned in an editorial in the *Railway Age Gazette* of March 23, 1911, page 627. In many cases, however, the results secured from such rails have not warranted the additional expenditure, the percentage of failures in some cases being equal to or greater than the failures with ordinary Bessemer rails. Since the roads are showing their willingness to pay a higher rate for better rails, the responsibility for inferior products rests largely on the manufacturers. The latter contend, however, that the prevailing price for Bessemer rails is from $1 to $2 a ton lower than the price on plates and shapes, which are similar products, and that the demand for a large tonnage of rails forces them to cut down the time consumed in the milling process, resulting in the poor quality of steel. The profit on steel manufacture seems to prove that the price at which rails are furnished is not abnormally low, and the fact that a number of roads have paid prices very much above the normal and have not secured good rails seems to indicate that even if higher prices were uniformly paid the rails obtained would be no more satisfactory.

The work of collecting statistical data on rails, which was started by the American Railway Association, has been transferred to the Rail Committee of the American Railway Engineering Association, which is composed of some of the most able engineers in the country. This committee has employed an engineer of tests at the expense of the railways and has carried on various elaborate tests, the results of which have been given wide publicity. Over 40 roads are now reporting to this committee statistics of their rail failures, and a number of the individual roads are giving careful study to their own record of failures. A great deal of work is planned for the next few years by this committee. It expects to continue its investigations with the aim of framing a comprehensive set of specifications under which a satisfactory quality of steel for rails will be manufactured. While it will probably be necessary to complete the tests outlined by the committee to determine exactly what chemical composition and mill practice will secure the best results, certain defects in present methods of manufacture are already well recognized, and the interests of the roads represented in the American Railway Engineering Association will be still further advanced if that association will recommend improved specifications to remedy such defects pending the conclusion of the experiments, when final recommendations can be made, based on the knowledge which will be gained.

THE RAILWAYS APPEAL TO THE COMMERCE COURT.

THE action of the transcontinental railways in petitioning the Commerce Court to enjoin the Interstate Commerce Commission from enforcing its orders in the Pacific coast rate cases was a natural, and perhaps inevitable, sequence of the investigations and orders made by the commission. Indeed, it probably was inevitable from the first that these cases should be carried into the courts, no matter what orders the commission issued. The interests of the innumerable communities and the numerous railways involved are so conflicting that no tribunal having less than superhuman wisdom and diplomacy could have rendered decisions and issued orders which all interests would have accepted as just and reasonable. Not only the railways but many of the shippers and communities concerned are dissatisfied with the commission's attitude, and if they were not all the other communities and shippers would be.

The commission's orders were discussed at considerable length in an editorial in the *Railway Age Gazette* of September 22, 1911, page 548. In their petitions the roads attack the long and short haul clause as amended by the Mann-Elkins act as unconstitutional, on the ground that it delegates to the commission legislative discretion. This will, no doubt, lead to decisions by the courts either nullifying the fourth section, or clearly defining its meaning and the powers it gives the commission. The roads further contend that if the fourth section be constitutional the orders of the commission are illegal, because they are arbitrary and unreasonable, and that it could not have been the intention of Congress to authorize it to act arbitrarily and unreasonably. The commission in the orders issued by it a year ago indicated a large number of commodity rates to Spokane, Salt Lake City, and other interior points which it held would be reasonable, there being specified by it, for example, 540 carload commodity rates and 436 less-than-carload commodity rates to Spokane and points east thereof. In its orders of June 22, 1911, it forbade the roads to make their rates from the Missouri river to intermediate points any higher than their rates to the coast, from Chicago more than 7 per cent. higher, from Pittsburgh more than 15 per cent. higher, and from New York more than 25 per cent. higher. Its two sets of orders are inconsistent with themselves. The roads could not obey the order of June 22, 1911, without either raising their present rates to the coast or making their rates to intermediate points from 3 to 9 per cent. less than the rates to intermediate points which the commission itself a year ago held would be reasonable. Furthermore, they could not accept the commission's rule that their rates to the intermediate points should never be made more than the specified percentages higher than their rates to the coast without making it necessary for them, in case increased water competition obliged them to further reduce their rates to the Pacific coast, to further reduce their rates to the intermediate points below what the commission has held would be reasonable.

The amounts of money directly and indirectly involved are something enormous. It is estimated that the reductions of earnings which would result directly from compliance with the commission's orders would be $12,000,000 a year. This at 6 per cent. would be the return on $200,000,000 of capital. At 5 per cent., about the average net earnings of all the railways of the United States, it would be the return on $240,000,000. Furthermore, if the roads made the reductions specifically required by the commission's orders they would in course of time have to make numerous reductions in rates to points east of Spokane, Salt Lake, etc. Finally, there are cases pending before the commission involving the rates from the Pacific coast eastward, and while the commission has not ordered reductions in these rates, it has indicated that it thinks they ought to be lowered by 20 per cent., which would involve additional losses.

Another reason why the commission's orders are objected to is that they seek to compel the roads to fix their rates to the intermediate points according to a scheme which is wholly illogical. It is well known that the practice of railways all over the United States has been to apply class rates ordinarily and to make commodity rates to meet unusual conditions. Heretofore, the railways have usually charged their class rates to intermediate western points, where there has been nothing extraordinary about transportation conditions, while, in order to meet water competition on the coast, they have made about 1,300 commodity rates on which from 90 to 95 per cent. of their traffic to the coast is handled. Under the commission's orders they would have to extend all of these commodity tariffs to the intermediate points, thus giving them rates entirely different from those given to any other similarly situated communities in the United States.

In point of principles involved these are as important railway rate cases as were ever brought in any court in the United States; and in point of money involved they are probably the most important proceedings of any kind ever begun in an American court.

NEW BOOKS.

Addresses to Engineering Students. Edited and published by Waddell & Harrington, consulting engineers, Kansas City, Mo. 6 in. x 9 in. 490 pages. Price, 75 cents when distributed to students through universities or colleges; single copies, $1.00.

About the first of 1911 circular letters were sent out by Waddell & Harrington to professors in engineering schools throughout the country calling their attention to the desirability of publishing in a single volume a number of the most valuable lectures which have been delivered to engineering students, with the vim of providing sound advice to such students to help them to obtain the full benefit of their courses of instruction and to guide them in their conduct at college and in after life in starting a successful professional career. These engineers offered to edit and publish such a volume, and the consensus of opinion as indicated by the replies to this circular letter was that the need for it was great and that assistance in placing it before students in engineering colleges could be readily secured from the faculties of leading institutions. In view of the opinion thus expressed it was decided to publish the book which has just appeared.

It includes 45 lectures by 22 authors, each of whom is a prominent engineer in some branch of the profession. The list includes such men as Ira O. Baker, Onward Bates, Charles H. Benjamin, J. L. Harrington, V. Kerapetoff, Walter C. Kerr, Francis C. Shenehon and J. A. L. Waddell.

The papers have been arranged in the book in the order in which it is thought best for a student to read them, and each is prefaced by a note concerning the author, the occasion of the delivery of the lecture or paper, and a brief word of advice as to the principle benefit to be derived from it. They are also arranged with the idea that a portion of the book may be read by students during each year of the engineering course. It is the intention to distribute copies through the faculties of engineering schools, and as the price was made to cover only the work of printing, binding and mailing the book, it is reasonable to expect that the work of distributing the volume will receive the hearty co-operation of educators who are interested in engineering training.

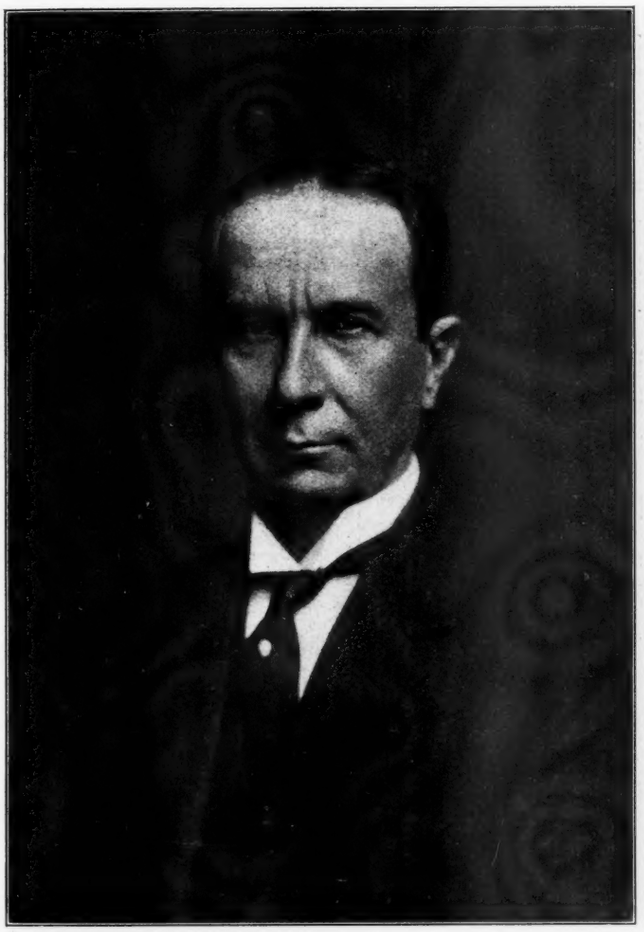
The Colombian Northern in Colombia starts at Bogota, and is now in operation to Nemocon and is expected to continue on to Chiquinquira, 66 miles farther, where it will meet the Puerto Wilches line to be extended from Bucaramanga. If the plans for this route are carried out, these two roads will form a great trunk line from Bogota to the Magdalena river, which will not only shorten the distance and the time consumed in the journey to the coast but will open up a vast extent of territory now but little developed.

REORGANIZATION OF THE HARRIMAN LINES.

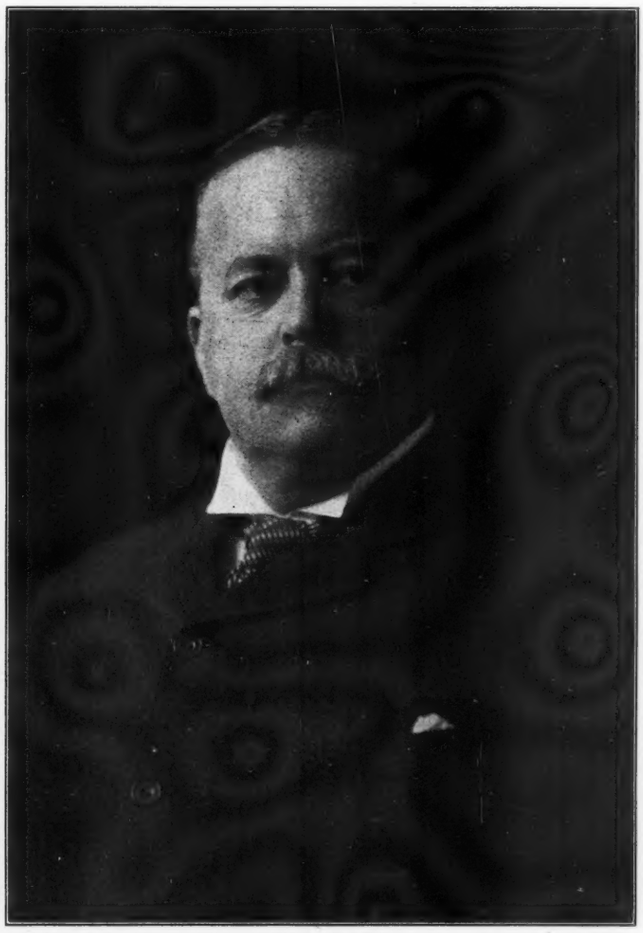
Judge R. S. Lovett, chairman and president of the Harriman Lines, on September 28 announced his retirement from the presidency of these roads and a number of other important changes, effective October 1. The changes announced by Judge Lovett, who remains chairman of the executive committee, and, as such, the chief executive authority of the system are as follows:

A. L. Mohler, vice-president and general manager of the Union Pacific, has been selected as president of that company, and of the Oregon Short Line, with headquarters at Omaha.

William Sproule, who was for a number of years its freight traffic manager, has been selected as president of the Southern Pacific Company, with headquarters at San Francisco. He has heretofore been president of Wells, Fargo & Company.



Robert S. Lovett.



J. Kruttschnitt.

Thornwell Fay, vice-president and general manager, has been selected as president of the companies operating the Southern Pacific Lines in Texas and Louisiana, with headquarters at Houston.

J. D. Farrell, vice-president in charge of the Puget Sound extension, has been selected as president of the Oregon-Washington Railroad & Navigation Company, with headquarters at Portland, Ore.

Epes Randolph, vice-president and general manager, has been selected as president of the Southern Pacific Railroad Company of Mexico, with headquarters at Tucson, Ariz.

Each of these presidents will have supervision of all local departments, and will be responsible for traffic as well as for transportation.

Julius Kruttschnitt, director of maintenance and operation, and L. J. Spence, the principal assistant of J. C. Stubbs, and who will succeed him as director of traffic next January (Mr. Stubbs having some time ago decided on account of failing health and advancing years to retire January 1, 1912, remaining, however, in a consulting capacity) will move from Chicago to New York. It was stated that they will retain all the authority now possessed by them, but will exercise it in a more critical and advisory and less administrative manner, relinquishing to the presidents much of the detail with which they have hitherto been burdened. They will become members of the board of directors and advisers of the chairman and the directors upon matters in their respective jurisdiction; and in conference with the chairman they will study the entire territory served by the lines and the development of the system as a whole, and will handle any other matters referred to them. In announcing the plan after its approval by the directors, Judge Lovett said:

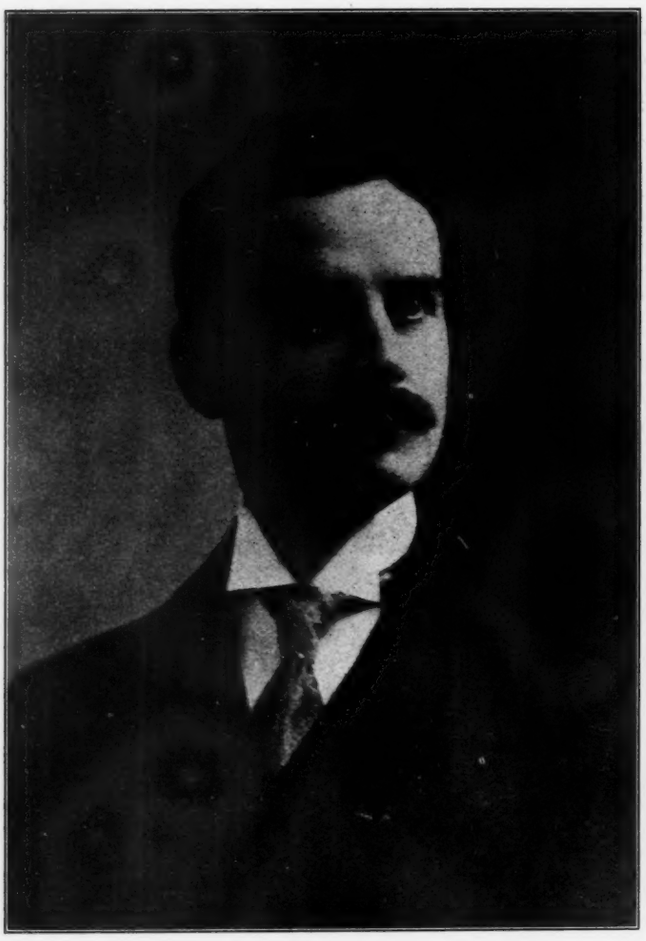
"The changes which have taken place in recent years in conditions affecting the management and operation of railways, particularly in the West, where development has been most rapid, has made it increasingly evident that the best interests of our properties and of the territories which they serve will be promoted by localizing the management with respect to local matters, vesting in a president on the line supervision of both traffic and transportation, and of all local departments with authority to decide promptly questions as they arise. But it is equally important that the central authority and jurisdiction of all questions affecting the system as a whole should continue to reside in the board and executive committee represented by the chairman of the executive committee with his immediate collaborators, the director of maintenance and operation and the director of traffic.

"The particular merit of the plan, in my judgment, is that it retains unimpaired in the chairman of the executive committee, the director of maintenance and operation and the director of traffic, the jurisdiction now exercised on all questions affecting the system as a whole, such as through rates, through service, standards of equipment, maintenance and efficiency, the larger questions of general policy and the close scrutiny and criticism of operating results, while at the same time it localizes the management, and brings the companies into closer touch and relationship with the public, and renders the management more directly and immediately responsive to the interests and needs of the traffic and the communities served."

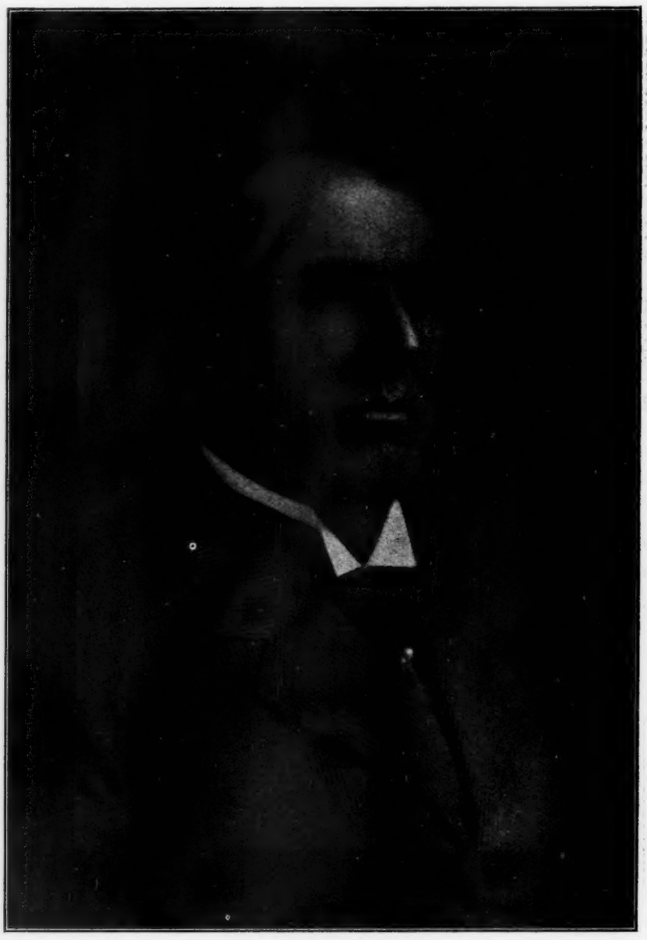
Those who have followed the development of the Hine unit system of organization on the Harriman Lines will at once perceive that by this reorganization the principles of that system are extended to the highest offices of the Harriman Lines. The division is now a unit; each district is a unit, and, under the new organization, each railway will be a unit, the largest unit of all being the system as a whole.

One of the greatest advantages of the new organization will be that it will make practicable the solution by the officers of each railway of all problems that are local to that particular railway. Under the old organization the operating head of each railway reported to Mr. Kruttschnitt and the traffic head of each railway reported to Mr. Stubbs. If, then, the operating officers and the traffic officers of the road differed about any matter it had to be referred to their respective superior officers, and if Mr. Kruttschnitt and Mr. Stubbs happened to differ about it it had to be referred to Judge Lovett in New York. Under the new system the president of each road will be the head of both its operating and its traffic organizations, and if the operating and traffic officers of the road differ as to whether certain additional train service shall be provided or certain branch lines or sidings constructed, or anything of that sort, the matter will go to the president of the road and be settled by him, unless it is a question of such great importance that he requires the advice of the director of maintenance and operation, or the director of traffic.

The result, so far as the individual roads are concerned, will be to enable them to deal with their local problems both more quickly and more satisfactorily to the people living along the lines than has been practicable in the past; and the director of maintenance and operation, the director of traffic and the chief executive officer of the system, now the chairman of the executive committee, will be relieved of the necessity of passing on a very large number of detail matters, which they have felt has prevented them from giving attention to the larger problems affecting the entire system.



L. J. Spence.



A. L. Mohler.

When Mr. Kruttschnitt and Mr. Spence, who will succeed Mr. Stubbs, remove from Chicago to New York, they will take with them their staffs of immediate assistants and the Chicago office will be practically abolished.

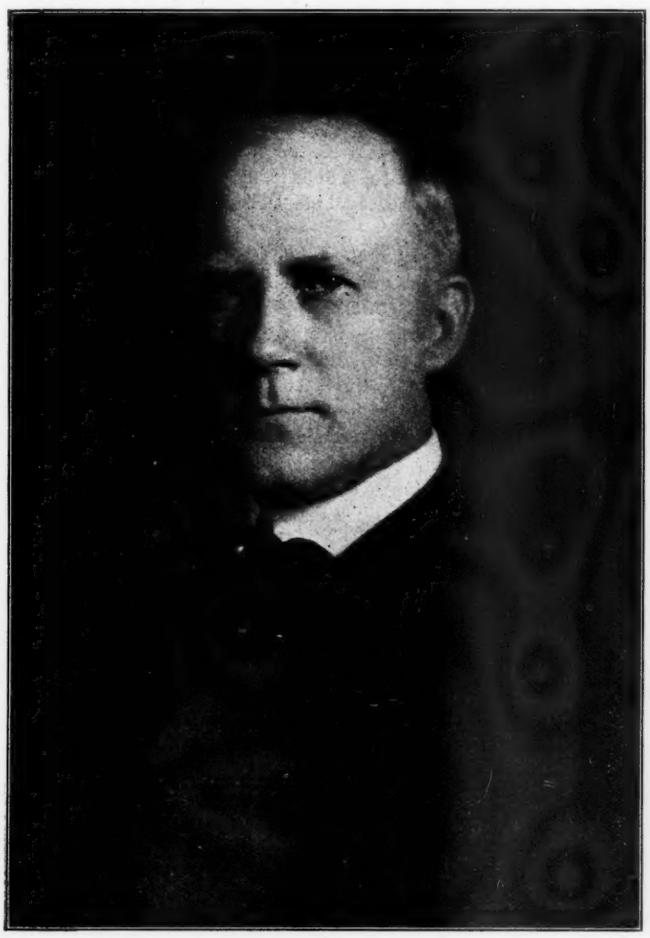
It is well known that the Harriman Lines have large steamship as well as railway interests. Their Morgan line of steamers, operating from New York to the Gulf of Mexico, has long been a very important factor in transcontinental traffic and in the determination of the rates that shall be applied to it. Mr. Spence, who, it is announced, will on January 1, 1912, succeed Mr. Stubbs as director of traffic, has had experience in handling the traffic of both the railway and the steamship lines. Prior to his appointment less than a year ago as Mr. Stubbs' assistant in Chicago, he was general eastern freight agent of the South-

ern Pacific, and also general freight agent of the Atlantic steamship lines of the Southern Pacific, with office at New York. Mr. Spence's rise in recent years has been very rapid. He was born September 16, 1868, at Wilmington, Del., and received a public school education. In October, 1885, he became a stenographer in the office of Edwin Hawley, then general eastern agent of the Southern Pacific at New York, and was afterward made chief clerk to the assistant general traffic manager there. For six years from 1896 he was eastern freight agent, and was promoted to general eastern freight agent in 1902. His jurisdiction was extended over the Atlantic steamship lines of the Southern Pacific in 1906, when he was given the title of general freight agent of those lines.

Mr. Mohler, who becomes president of the Union Pacific, is no stranger to the duties of the president's office. He was president of the Oregon Railroad & Navigation Company for seven years before he was appointed, in April, 1904, general manager of the Union Pacific. During the years that he has been its general manager the Union Pacific has enjoyed its most rapid development and its greatest prosperity. Under Mr. Kruttschnitt's general supervision, Mr. Mohler has made it the fine property physically that it is so well known to be. And, yet, while he has been so successful an operating executive, he did not get most of his railway training in the operating department. His first work was as warehouse and office clerk on the Chicago & North Western at Galt, Ill. This was in 1868. He then served in various positions in the traffic departments of different roads until 1888, when he was transferred from general freight agent to general superintendent of the St. Paul, Minneapolis & Manitoba, now the Great Northern, and he has been in the operating department ever since. Under the new organization the traffic department of the Union Pacific will report directly to him, and, owing to his past experience in that department, its problems will have no novelty for him.

It is said that when Mr. Mohler went from the Oregon Railroad & Navigation Company to the Union Pacific he did not even take his secretary with him, and that he hesitated some time before he finally decided to take with him the cook on his car. This is characteristic of his way of dealing with his subordinates. When a railway executive officer goes from one road to another and, without any apparent cause, takes with him a good many men to supplant those on the road to which he goes, he is apt to excite antagonism on the part of a great majority of its officers and employees—an antagonism which will be an obstacle to the success of his work as long as it lasts. Mr. Mohler, with all his force, is naturally diplomatic, and, therefore, is always very unlikely to do anything that will cause unnecessary antagonism on the part of either his subordinates, his superiors or the patrons of the railway. This has been one of the secrets of his success. On the other hand, when he has felt that he should express himself regarding the relations of his road to the public, he has been notably plain spoken.

Mr. Mohler was born at Ephrata, Pa., in 1850. As stated above, he began railway work with the Chicago & North Western as warehouse and office clerk in 1868. Two years later he was made a station agent at Erie, Ill., of the Rockford, Rock Island & St. Louis, now part of the Burlington Route. For 11 years from 1871 he was with the Burlington, Cedar Rapids & Minnesota, now part of the Rock Island System, first as traveling auditor and for nine years in the traffic department, where he was promoted successively until he was made general freight agent. He then went with the St. Paul, Minnesota & Manitoba,



William Sproule.

Thornwell Fay.

where for six years he was general freight agent and land commissioner, and in April, 1888, was transferred to the operating department as general superintendent. He was soon promoted to assistant general manager and for four years, from 1889 was general manager of that road and the Montana Central. In July, 1894, he was appointed general manager of the Minneapolis & St. Louis, and three years later was elected president and general manager of the Oregon Railroad & Navigation Company. He was appointed general manager of the Union Pacific in April, 1904, and a year later was elected vice-president and general manager, which title he has held to date.

Mr. Sproule, who is to be the new president of the Southern Pacific, will be one of the growing number of traffic men who have been promoted to the presidencies of large railways. All of his railway experience he has had on the road to which he now returns as president, after having been out of railway work since 1906. Mr. Sproule was born in Ireland 53 years ago. He came to New York when a boy, and previous to entering railway service in 1882 was engaged in mercantile business in California. He went with the Southern Pacific as a freight clerk in 1882, and for ten years from 1887 was assistant general freight agent of the Pacific system of the Southern Pacific. From 1897 to 1898 he was general freight agent, and was promoted to freight traffic manager in 1898, which office he held until 1906, when he became traffic manager of the American Smelting & Refining Company in New York. He was elected president of Wells, Fargo & Company early in 1911.

Mr. Sproule is thoroughly acquainted with the Southern Pacific property itself, with the country through which it runs, and with the conditions of all kinds under which it has to carry on its business. He was recognized before he left the Southern Pacific as one of the ablest railway traffic officers in the country. He is not only a man of great ability, but belongs to the modern school of railway men who recognize the fact that the business of the railway manager is not only to get traffic and to get trains over the road, but also to conduct the affairs of the property in such a way as to produce the minimum of friction and bring about the maximum of co-operation with the people of the territory that it serves.

Mr. Farrell, the new president of the Oregon-Washington Railroad & Navigation Company, has had a varied experience. He began railway work as a track laborer, did engineering work, was a conductor and then an operating officer, and was in the mining and steamboat business for a time. He was for some years James J. Hill's principal representative on the Pacific coast, being president of the Northern Steamship Company and also assistant to the president of the Great Northern. When Mr. Harriman decided to extend his lines to Puget Sound, Mr. Farrell was chosen by him as the best man to do the work, and to him is very largely owing the fact that the Harriman Lines are already running trains regularly into Seattle and Tacoma. The skill and success with which he handled all of the negotiations and all of the development work incidental to the extensions of the Harriman Lines referred to are, no doubt, in considerable measure due to the broad business experience that he had had. He is a very decisive, incisive and forceful man, and no one in the country knows better the people and the conditions in the northwestern part of the United States than he does. When he is not busy with his railway duties he is enjoying himself running a dairy farm near Seattle, and it is said by his friends that he is a very good dairy farmer. His farm is one of the best of its kind in the northwest.

Mr. Farrell was born July 31, 1856, at Brasher Falls, St. Lawrence county, New York. For several years from 1877 he was with the Chicago & North Western and the Chicago, Milwaukee & St. Paul, doing various work in the track, construction, bridges and buildings and water service departments. He then went with the Canadian Pacific, and in 1884 was appointed assistant superintendent of bridges and buildings and water department of the Western division of that road. Beginning in 1885 he had several years' experience as brakeman, station agent and passenger conductor on the Canadian Pacific and on the St. Paul, Minneapolis & Manitoba, now the Great Northern. He was appointed trainmaster of the Chicago, St. Paul & Kansas City, now the Chicago Great Western, in 1888, and the next year was promoted to division superintendent. In June, 1892, he went with the Great Northern, where he was, consecutively, superintendent, assistant general superintendent and general superintendent, leaving the latter position in 1895 to engage in the mining and steamboat business. He was president of the Pacific Coast Company from 1898 to 1903, having been general manager also of the same company for four years from 1898. From February, 1903, to July, 1905, he was president of the Northern Steamship Company, and from March, 1903, to July, 1905, was also assistant to the president of the Great Northern. He then left the Hill Lines.

The new president of the Southern Pacific Lines in Texas and Louisiana, Thornwell Fay, has not only grown up on these properties, but he has long been associated in railway work with Mr. Kruttschnitt. He was chief clerk to Mr. Kruttschnitt when the latter was general manager of the Southern Pacific's Atlantic system at New Orleans, over 20 years ago. His entire railway career has been spent on the properties of which he now becomes president. Needless, to say, he is thoroughly familiar with the conditions of every kind under which they are operated.

Everyone knows the difficulties under which the managers of Texas railways have had to work. They have had to deal with an adverse public sentiment and to negotiate with a railway commission which has not only imposed stringent requirements on them, but has fixed rates so low as to make it very difficult to meet these requirements. The fact that Mr. Fay has been able for over seven years to perform his duties as vice-president and general manager of these properties in such a way as to maintain them on a reasonably prosperous basis, and at the same time gain for himself the favor of his superior officers and no small measure of popularity in Texas, is a sufficient indication both of his executive ability and of his diplomacy.

Probably no other railway officer in the country has taken a keener and more intelligent interest in all problems pertaining to the public relations of the railway. He has done a great deal to educate the employees of the road to so treat their patrons as to mitigate the hostility of public sentiment. He has done much to give the public correct information regarding railway matters. The relations between the railways and the people of Texas are today more harmonious and the railway outlook there is a good deal brighter than it has been in many years. For this improvement in conditions Mr. Fay deserves no small part of the credit.

Mr. Fay was born March 13, 1861, and began railway work when he was 17 years old as a telegraph operator on Morgan's Louisiana & Texas Railroad & Steamship Company, and remained with that company until 1885, serving consecutively as station agent, train despatcher and private secretary to the president. He was then for 15 years with the Atlantic System of the Southern Pacific Company, first as secretary to the general manager, then chief clerk to the general manager, and later manager's assistant. He was elected vice-president and general manager of the Southern Pacific lines in Louisiana in January, 1902, and in April, 1904, was elected also vice-president and general manager of the lines in Texas.

Epes Randolph, who becomes president of the Southern Pacific lines in Mexico, first won distinction in railway service as an engineer. His early work was in the engineering departments of railways in the eastern part of the United States that were controlled by Collis P. Huntington, and he became one of Mr. Huntington's most trusted lieutenants. When the Chesapeake & Ohio made its entrance to Cincinnati it was Mr. Randolph who built its bridge across the Ohio river under difficulties which some other engineers had regarded as insurmountable. In 1894 it became necessary for Mr. Randolph to go to Arizona on account

of his health. He stayed out of railway service a year, and then went with the Southern Pacific, still being with Mr. Huntington. After Mr. Harriman acquired control of the Southern Pacific Mr. Randolph maintained much the same relationship to him that he had to Mr. Huntington. Among other things he was made president of the California Development Company, a Southern Pacific enterprise which had much to do with the development of the rich Imperial valley which lies in California just north of the California-Mexico line. He was president of this company in 1906, when the entire valley was threatened with desolation by an overflow of the Colorado river. The story of the work done to save the country was told in *The Railway Age* of June 14, 1907. It was carried on under the supervision of Mr. Randolph, whose engineering experience and skill, coupled with his remarkable capacity for quick action, probably saved the country. Subsequently, when the Southern Pacific decided to extend its lines into Mexico, naturally Mr. Randolph was chosen to handle the work, which has been carried out with the greatest success. There are not a few persons, who know Mr. Randolph well, who believe that if it had not been for his delicate health he would have long since taken rank in the general estimation as one of America's greatest railway men.

Previous to March, 1891, Mr. Randolph was superintendent and chief engineer of the Elizabethtown, Lexington & Big Sandy, the Kentucky & South Atlantic, and the Ohio & Big Sandy, all now parts of the Chesapeake & Ohio. For two years from the date mentioned he held the same titles on the Newport News & Mississippi Valley and the Ohio Valley, and in January, 1893, had his jurisdiction extended over the Chesapeake, Ohio & Southwestern, all three of which roads are now parts of the Illinois Central. He was appointed superintendent of the Yuma and Tucson divisions of the Southern Pacific in May, 1895, and was promoted to general manager of the Los Angeles Railway and the Pacific Electric Railway in 1901. In February, 1902, he was elected president of the Gila Valley, Globe & Northern, the Maricopa & Phoenix, the Arizona & Colorado, the Cananea, Yaqui River & Pacific and the Sonora Railway, and since June, 1909, when he was made vice-president of the Southern Pacific Railroad of Mexico, he has been general manager also of these lines.

REVENUES AND EXPENSES OF STEAM ROADS OVER FIFTY MILES LONG.*

The accompanying table presents statistics of operating revenues and expenses covering the fiscal year ending June 30, 1911. The table includes returns from 93 per cent. of the railway mileage of the United States. The average mileage operated by these railways during the fiscal year 1911 was 225,067 miles. The returns of a few recently opened or newly reorganized railways have been omitted from this table, because comparable returns for 1910 were not available.

There is much new railway construction in Natal. The new lines authorized at the last session of the Union Parliament to be constructed in Natal were as follows: (1) Stuartstown to Union Bridge, 16 miles. The line is to be of 2-ft. gage and the estimated cost is $243,325. (2) Winterton to Bergville, 18 miles. The estimated cost of this line, which is to be an extension of the Upper Tugela branch, is $421,955. (3) Greytown to Krantzkop, 33 miles. This line, which is a northeasterly extension of the Pietermaritzburg-Greytown line, is estimated to cost $837,670. In addition to the foregoing, 37 miles of the 69-mile Piet Retief-Vryheid line from Piet Retief in the Transvaal to Vryheid in Natal is within this province. The estimated cost of the entire line is $1,945,529, and construction to the value of $1,043,250 pertains to Natal.

*Compiled by the Bureau of Railway Economics from monthly reports of the railways to the Interstate Commerce Commission. This tabulation includes 93.1 per cent. of the mileage of steam roads which filed reports with the commission in May.

REVENUES AND EXPENSES OF STEAM ROADS OVER FIFTY MILES LONG—FISCAL YEAR ENDING JUNE 30, 1911.

Account.	Total.				Eastern Group.				Southern Group.				Western Group.			
	Amount, 1911.	Per Mile of Line.	Increase over 1910. Per Mile.	Increase over 1910. Per Cent.	Amount, 1911.	Per Mile of Line.	Increase over 1910. Per Mile.	Increase over 1910. Per Cent.	Amount, 1911.	Per Mile of Line.	Increase over 1910. Per Mile.	Increase over 1910. Per Cent.	Amount, 1911.	Per Mile of Line.	Increase over 1910. Per Mile.	Increase over 1910. Per Cent.
Total Operating Revenues	$2,700,232,308	$11,997	d$70	d .6	$1,273,360,738	$18,942	$133	.7	$345,604,131	$9,034	$286	3.3	$1,081,267,439	$9,042	d$252	d2.7
Freight	1,857,426,695	8,253	d172	d2.0	882,637,636	13,130	d109	d .8	246,466,764	6,443	109	1.7	728,322,295	6,090	d264	d4.2
Passenger	639,381,447	2,841	73	2.6	291,344,098	4,334	198	4.8	75,103,646	1,963	144	7.9	272,933,703	2,282	d 11	d .5
Other transportation	177,453,810	788	27	3.5	86,499,814	1,286	36	2.8	20,270,583	530	16	3.1	70,733,413	591	29	5.1
Non-transportation	25,970,356	115	2	1.8	12,929,190	192	8	4.4	3,763,138	98	17	20.7	9,278,028	78	d 6	d6.9
Total Operating Expenses	1,855,253,049	8,243	236	2.9	898,806,586	13,371	696	5.5	234,777,075	6,137	370	6.4	721,669,388	6,035	d 34	d .6
Maintenance of way and structures	353,547,454	1,571	d 45	d2.8	158,069,391	2,351	50	2.2	47,164,375	1,233	75	6.5	148,313,688	1,240	d132	d9.6
Maintenance of equipment	417,625,857	1,856	31	1.7	211,119,610	3,141	50	1.6	57,112,037	1,493	53	3.7	149,394,210	1,249	22	1.8
Traffic	57,442,768	255	9	3.7	25,574,985	380	15	4.0	8,214,439	215	6	2.9	23,653,344	198	8	4.1
Transportation	957,453,560	4,254	224	5.6	473,445,833	7,043	546	8.4	112,493,284	2,941	232	8.6	371,514,443	3,107	57	1.9
General	69,183,410	307	17	5.9	30,596,767	455	36	8.5	9,792,940	256	4	1.7	28,793,703	241	12	5.1
Net Operating Revenue	844,979,259	3,754	d305	d7.5	374,554,152	5,572	d563	d9.2	110,827,056	2,897	d 83	d2.8	359,598,051	3,007	d218	d6.7
Outside Oper.—Net Revenue	1,392,469	6	..	..	745,461	11	..	..	224,168	6	..	..	422,840	4	..	..
Taxes	104,195,144	463	10	2.2	48,473,292	721	33	4.7	12,322,957	322	28	9.5	43,398,895	363	d 7	d1.8
Operating Income	742,176,584	3,298	d318	d8.8	326,826,321	4,862	d591	d18.4	98,728,267	2,581	d112	d4.2	316,621,996	2,648	d217	d7.6
Miles operated, Average, 1911		225,067				67,222				38,255				119,589		
1910		221,553				66,731				37,527				117,294		

d Decrease.

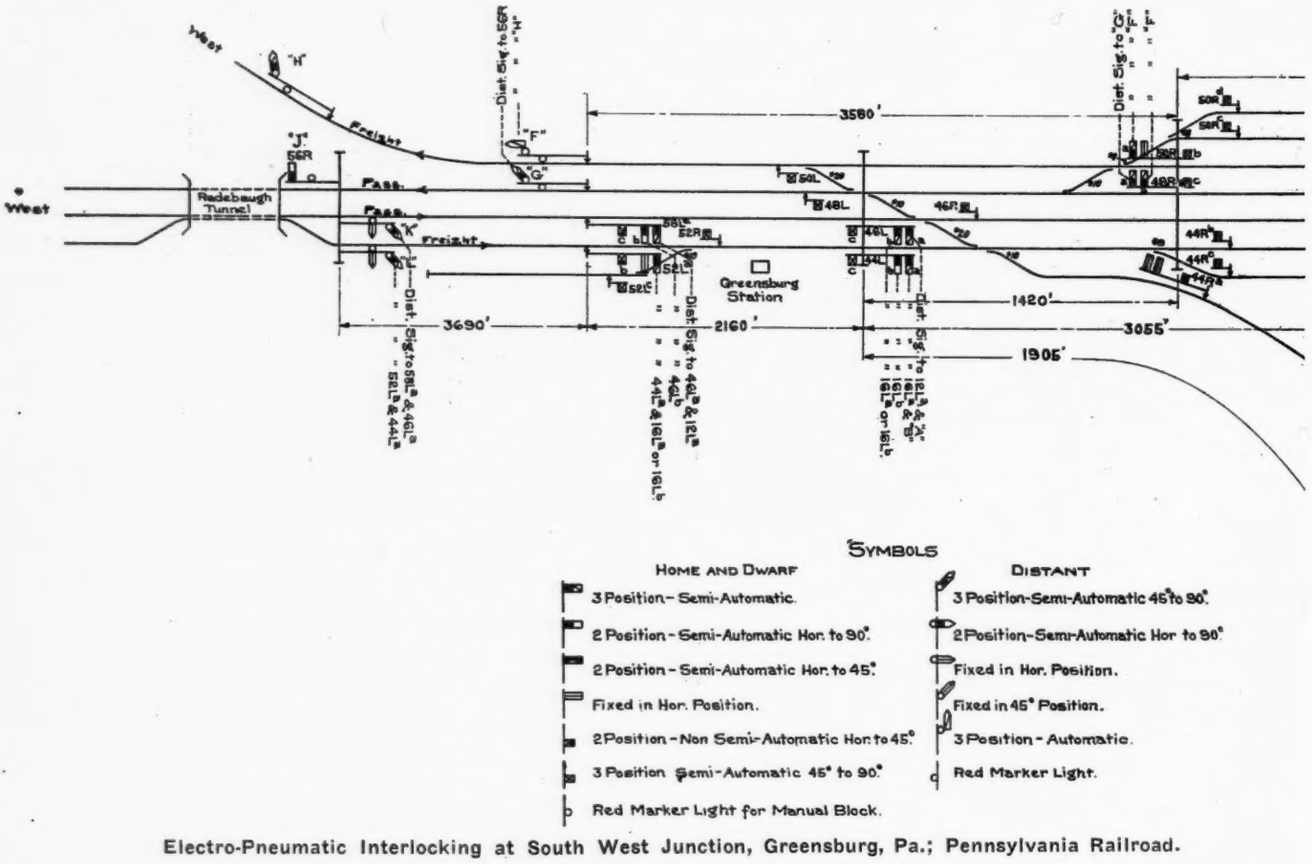
INTERLOCKING AT SOUTH WEST JUNCTION.

The extensive electro-pneumatic interlocking at South West Junction, Greensburg, Pa., on the Pittsburgh division of the Pennsylvania Railroad, 31 miles east of Pittsburgh, which has been under construction for several months, was put in service on September 4, establishing one of the largest interlockings ever constructed outside a large city terminal. This work, carried out in connection with some changes in alinement of tracks, has necessitated many temporary track and signal changes. One double track tunnel is done away with. The improvement completes the four track system between New York and Pittsburgh, with the exception of the eastbound gauntlet at Radebaugh Tunnel. This tunnel is shown in the drawing, west of signal "J." Greensburg station, with island platforms, is situated between signals 52L and 44L. Included in the change is the installation of a "duck-under" of the east leg of the "Y" leading to the South West Branch. This track connects with the west bound tracks of the main line and is used principally by coal trains. The west leg of the "Y" carries a considerable local passenger traffic to and from Pittsburgh.

This interlocking is noteworthy in several respects. As before observed it is one of the extensive plants, in territory covered, ever installed outside a city terminal. It has 19 switch levers operating 42 functions, and 29 signal levers operating 113 functions; a 59-lever machine with 48 working levers, operating 155 functions. The distance between the easternmost and the westernmost distant signals on the main line is nearly three miles, i. e., 15,040 ft., and between home signals over two miles, i. e., 11,140 ft.; while between the extreme switches it is about 7,350 ft. All functions are operated by compressed air (electro-pneumatic), the signals being three-position, upper quadrant. The "stop and proceed" signals (automatic) have two lights staggered, and pointed arm or arms; the "stop and stay" signals have lights arranged vertically and square end arms. Alternating current track circuits are used throughout. Circuits are arranged for approach and route locking, so that after signals are cleared the route over which they govern cannot be changed until the train has passed over it, except that to give the elasticity necessary (which can only be attained by allowing routes to be changed quickly after movements have been made) this route locking is so arranged that any switch may be moved after the signals have been restored to stop, and the train has passed entirely over it and beyond its fouling point.

The electric circuits which control the home and dwarf signals and switches are direct current supplied from a storage battery in the cabin; while the distant and automatic signals are controlled by alternating current. All signals are electrically lighted.

This plant is one of the finest examples yet installed of "speed signaling" as recommended by Committee No. 1, of the Railway Signal Association, and Committee No. 10, of the American Railway Engineering Association, and affords an excellent demonstration of the utility of this method.



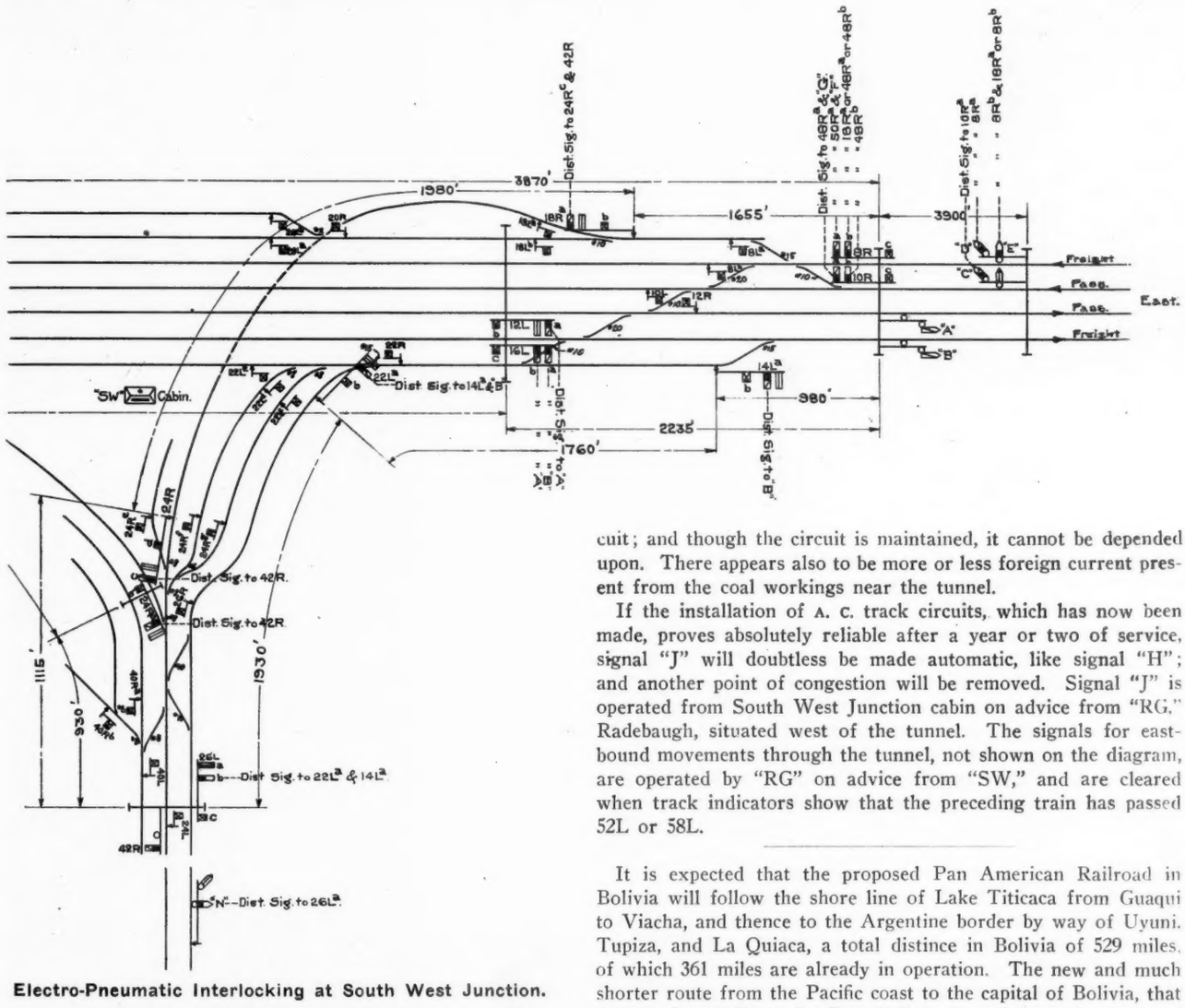
Electro-Pneumatic Interlocking at South West Junction, Greensburg, Pa.; Pennsylvania Railroad.

Drawing continued on next page.

The high and medium speed signals are semi-automatic. The low speed signals are semi-automatic only between 45 deg. and 90 deg., and assume the 90 deg. (clear) position only when governing movements in the direction of the current of traffic, with track clear and next signal at proceed (caution or clear). In the 45 deg. position they govern to any route, either with or against traffic, and with next signal at stop or with track occupied. Thus they can be used to advance trains in case of failure of the semi-automatic feature of the high signals. The value of this is apparent from the obvious fact that on account of the great distances from the cabin, the issue of clearance cards under such circumstances would cause serious delay. The low-speed signals are used also for shifting movements which otherwise would have to be made against stop signals. Dwarf signals are provided with the same method of control as the low speed arms of the high signals. Each high signal at proceed (caution or clear) indicates not only clear track, but also the position of the next signal.

Thirty-six hundred feet (3,600 ft.) is established as the safe distance at this point to ensure stoppage of the fastest trains between the distant and the home signals; obviously any shorter distance than this would be insufficient.

Referring to the diagram, it will be noted that the distance from signal L to 52L is 3,690 ft., but that 52L to 44L is 2,160 ft., 44L to 16L is 3,055 ft., and 16L to "B" is 2,235 ft. Therefore there is not full braking distance for the highest speed train between these latter signals, although in some cases the distance is sufficient if two signals in the rear show caution. It would not give the needed facility if signal L were made a distant for signals 52L, 44L, 16L and "B"—showing caution if any one of these signals were at stop, as, if "B" were at stop, it would greatly



Electro-Pneumatic Interlocking at South West Junction.

Drawing continued from preceding page.

reduce the track capacity to show "caution" at a point over two miles away, when 3,600 ft. is sufficient. If the territory were divided, for signaling purposes, into two interlockings with an advance signal on the bridge near signal 44R, making L a distant for 52L and 44L, and this advance signal and the latter in turn a distant for 16L and "B," still the end would not be attained, for this new distant would be only 1,635 feet from 16L, not a sufficient braking distance. By the use, however, of home signals as distant signals for the next signal or two signals ahead, sufficient braking distance is obtained by overlapping the distant indications, continuing the caution indication until a signal in advance is clear.

The utility of signal 58L on the eastbound passenger track may not be apparent, there being no switches between it and 46L. Greensburg station is situated between these signals, and several trains originating at Greensburg for points on Southwest Branch are made up in the yard and backed west on this track. Signal 58L is to protect this movement, rendering flagging back unnecessary.

It will be noticed that signal "J" governing the westbound passenger track through Radebaugh Tunnel is a "stop and stay" signal. Absolute block is maintained through this and the eastbound tunnel. The conditions at this point are and have been peculiar for years. Although the tunnel is dry, a coating of insulating material will form on the rails in a very short time to such an extent that a train will not shunt the direct current circuit; and though the circuit is maintained, it cannot be depended upon. There appears also to be more or less foreign current present from the coal workings near the tunnel.

If the installation of A. C. track circuits, which has now been made, proves absolutely reliable after a year or two of service, signal "J" will doubtless be made automatic, like signal "H"; and another point of congestion will be removed. Signal "J" is operated from South West Junction cabin on advice from "RG," Radebaugh, situated west of the tunnel. The signals for eastbound movements through the tunnel, not shown on the diagram, are operated by "RG" on advice from "SW," and are cleared when track indicators show that the preceding train has passed 52L or 58L.

It is expected that the proposed Pan American Railroad in Bolivia will follow the shore line of Lake Titicaca from Guaqui to Viacha, and thence to the Argentine border by way of Uyuni, Tupiza, and La Quiaca, a total distince in Bolivia of 529 miles, of which 361 miles are already in operation. The new and much shorter route from the Pacific coast to the capital of Bolivia, that from Arica, Chile, to La Paz, Bolivia, is under construction and is well on its way toward completion, the intention being to have the entire line in operation by the end of 1911. The distance between the two cities by this railway will be only 250 miles, or only about one-third as long as the older route. Up to April, 1911, the contractors had already put into operation about 56 miles of road from Viacha to Corocoro. A portion of this line, that from kilometer 70 to kilometer 112, is the rack-rail system. At the former point the altitude is 4,921 ft., and the climate is delightful and very healthful. At kilometer 110 there is an altitude of 11,811 ft., and the highest point on the line is 14,108 ft. It is proposed to make the entire journey—that is, upward from Arica to La Paz—in 14 hours, while down it will take only 12 hours. Compressed oxygen will be carried to protect the passengers against mountain sickness.

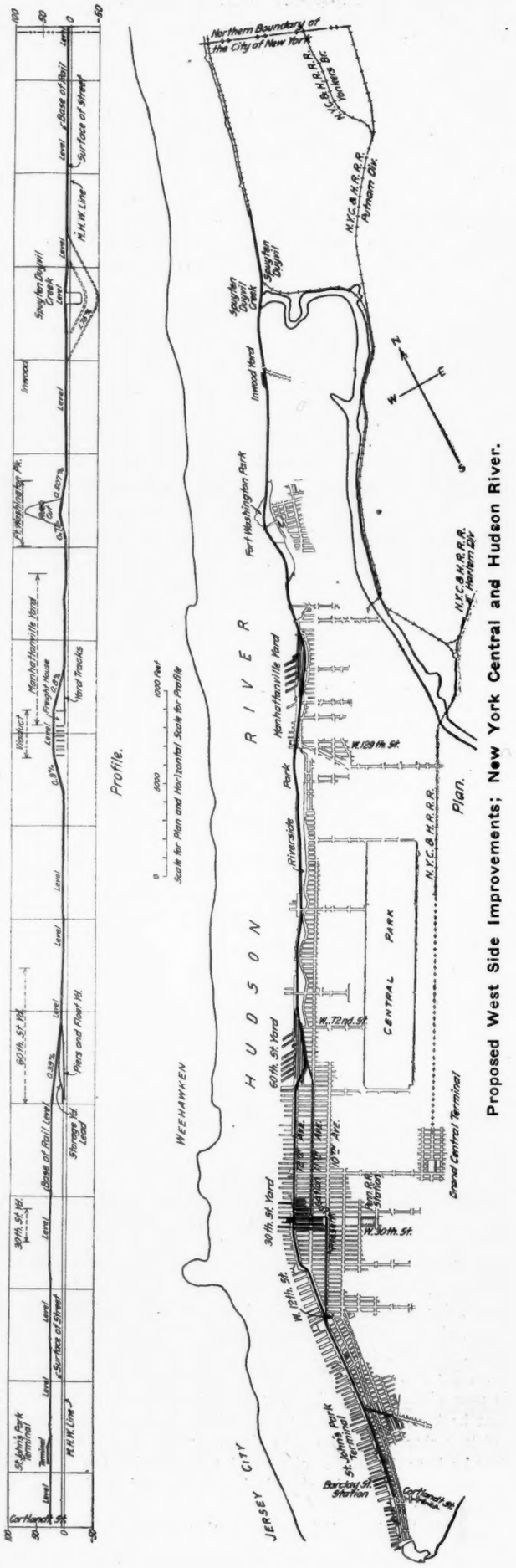
NEW YORK CENTRAL'S WEST SIDE IMPROVEMENTS IN NEW YORK CITY.

The New York Central freight line into New York City diverges from the main line at Spuyten Duyvil and runs south along the river front. From the Sixtieth street yards to the Thirtieth street yards the tracks are on Eleventh avenue at grade; at the Thirtieth street yards they swing east to Tenth avenue, continuing down that street to West Twelfth street, whence they continue down West street, which is at the river's edge, to the terminal at St. John's Park. At various points about the city the road maintains docks to which freight is transferred from Thirtieth street on lighters or car floats. The existence of this freight line on crowded streets has been disadvantageous both to the city and to the railway for obvious reasons: people were killed; operation was slow and expensive; the river front was made unsightly in front of Riverside Park, which extends from Seventy-second street northward to One-hundred-and-twenty-ninth street; and there were complaints of the smoke nuisance.

Various plans have been suggested for the improvement of the whole west water front of the city. One was to construct a freight and passenger subway. This was somewhat along the lines promulgated in Mr. Wilgus' plan for freight subways, which was published in these columns several years ago. Calvin Tomkins, dock commissioner, proposed an elevated railway, to be owned by the city, and a union freight terminal in the neighborhood of Thirtieth street, to be owned by the city, but to be operated by a terminal company controlled by various railways. Access to this terminal would be had by the New York Central direct and by the roads terminating across the Hudson river on the Jersey shore by car-floats.

Negotiations between the New York Central and the city have been under way for some time. For a while these negotiations were hampered by a manufactured "public opinion" clamoring for "immediate" removal of the tracks off the streets at any cost. This culminated when the legal right of the road to operate its trains was questioned, on the ground that the company's franchise for the use of the streets had expired. A test suit was brought and carried through various courts until the Court of Appeals decided in favor of the railway. This cleared the way for bills which passed the New York legislature this year, empowering the Board of Estimate of New York City to enter into an agreement with the railway company as to the plan to be followed in getting the tracks off the streets. This agreement is to be binding; the approval of no other body being required. The bills prescribe the general plan, which is as follows: There are to be no grade crossings; from Spuyten Duyvil to Seventy-second street, the tracks may be on the ground, but they are to be roofed over within the limits of city parks, of which there are now two, Fort Washington Park and Riverside Park; south of Seventy-second street they are to be carried on an elevated structure to the southern end of the island; the use of steam locomotives is to cease within four years from the date of agreement between the Board of Estimate and the railway company; and the whole work is to be finished within six years from that date. The railway was to submit plans to the Board of Estimate by October 1. If no agreement is reached by January 1, 1912, the Board of Estimate is to appeal to the legislature for further action.

The New York Central submitted its plan last week. The accompanying map and profile shows its main features, which provide for the removal of about 13 miles of track from the surface of the streets. It is not suggested that the tunnel under Spuyten Duyvil be built at first. Provision is made for six tracks as far south as the Sixtieth street yard and thence a four-track line to Cortlandt street on an elevated structure. Instead of running down Tenth and Eleventh avenues it is to run on the "Marginal Way" along the waterfront. There are no tracks at present south of St. John's Park, but the plan calls

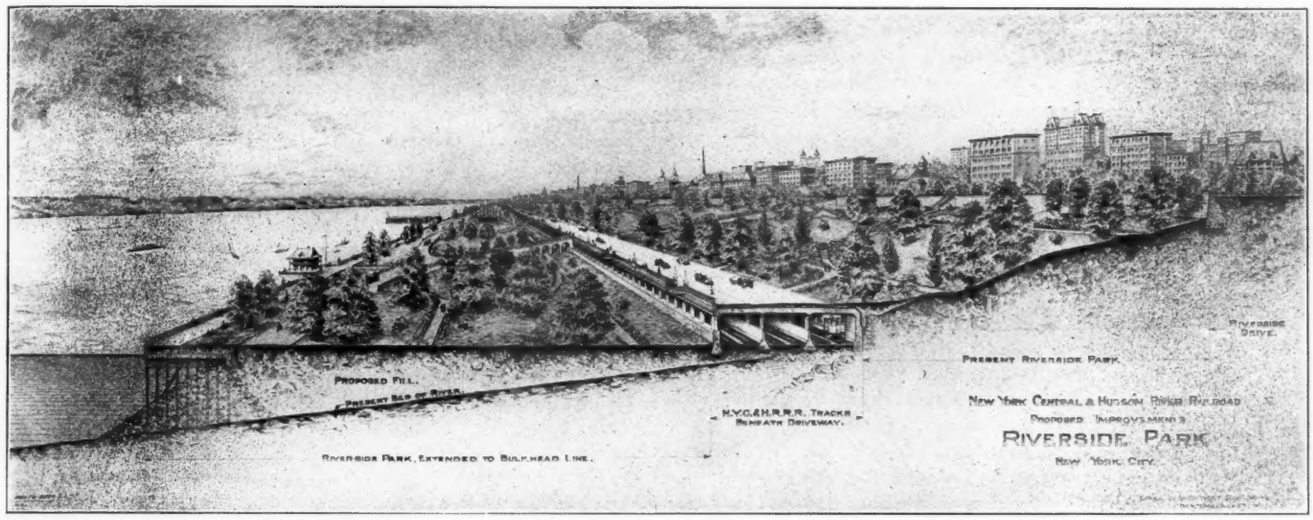


for an elevated structure as far as Cortlandt street, where the New York Central operates two piers at present. There is now a small yard at Manhattanville. The plan is to enlarge these yards and perhaps build some piers. At the site of the Thirtieth street yard the terminal buildings are to be built, with spurs of the elevated road running between them on the second story level. Owing to the slope of the ground, the second story will be at street level on Tenth street, so that trucks can come in on a level with the tracks. Freight is to be received and distributed on the lower level on Eleventh street and Twelfth street. Somewhat similar treatment is planned for the St. John's Park yard. Spurs at various points can be run from the elevated structure to the different piers and to private industries.

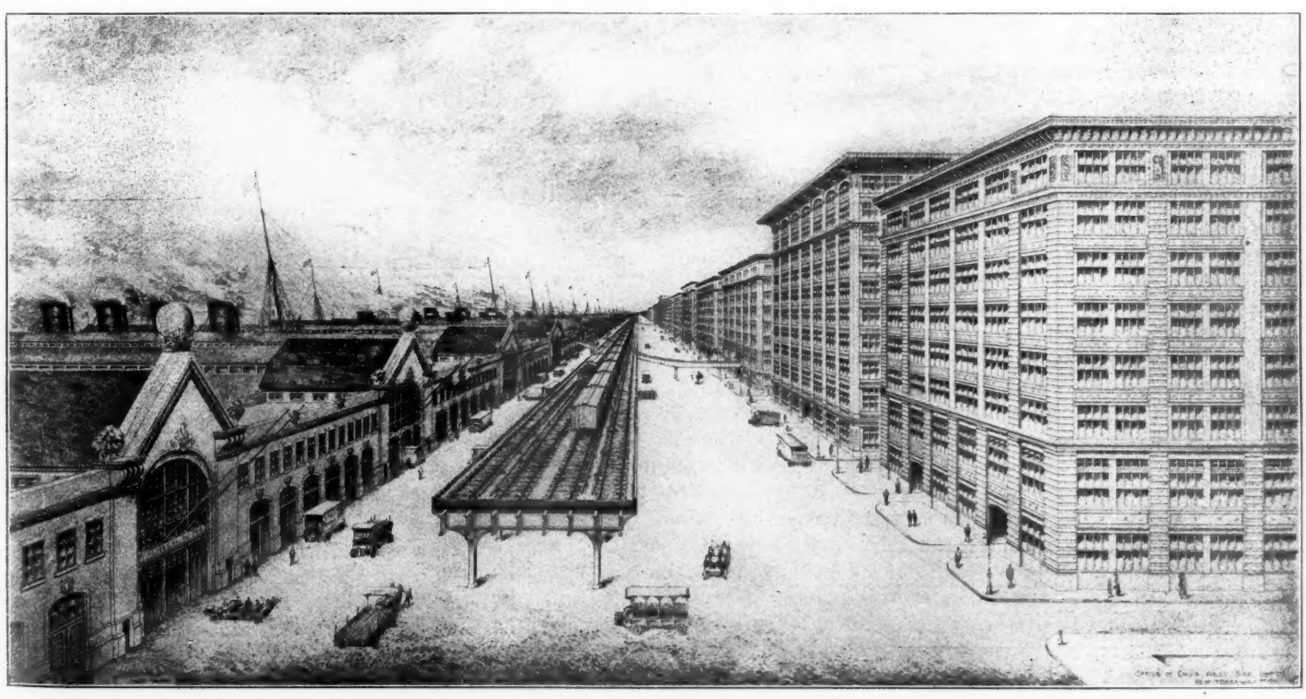
One of the accompanying drawings shows the proposed treatment through Riverside Park. It is suggested that there be a driveway, as shown, on the roof over the tracks. The design of the roof covering and the cost to the railway is about the same whether such a drive is constructed or whether the right-of-way is entirely covered with earth. In the latter case provision would have to be made for ventilation.

In time, the passenger traffic at the Grand Central station will presumably increase so that some of it should be diverted to the west side line. In this case, permission would be asked to build a connecting tunnel in the neighborhood of Fifty-seventh street.

The total cost is estimated at $65,000,000, of which $43,000,000 would be required to put into effect the first stage of the improvements. All of this cost is to be borne by the railway company (contrary to the policy of the state and many cities in the state, where the state or municipality, or both, bear part of the expense of grade crossing elimination), receiving in return a perpetual franchise for such extensions and tracks as are not now possessed, and for a six-track and four-track line north and south of Seventy-second street respectively, in place of the four and two track lines now existing.



Typical Section in Riverside Park.



Typical Location of Elevated Structure.

LETTERS FROM AN OLD RAILWAY OFFICIAL TO HIS SON, A GENERAL MANAGER.*

XIX. Chicago, August 12, 1911.

My dear Boy: As the old order changeth, yielding place to new, the last of the feudal barons among the chief engineers are passing. Bold have been their conceptions, faithful their performances and great their achievements. Their work has developed those splendid types of manhood which are characteristic of the futile struggle of nature against art, of the wilderness against civilization.

Partly because of better intellectual training, partly because of the rush to complete additions and betterments and partly because of the inborn tendency of human nature to over-specialize, the construction men of most railways have frequently put it over on the so-called operating men. Peace hath her victories no less renowned than war. As civilization advances the struggles of a railway are less against physical nature and more against sociological and political conditions. This advanced stage makes for altruism and comprehensive co-operation. The problem of the construction engineer becomes harder when his work is interwoven with the necessities of everyday operation. A manufacturing plant can sometimes shut down during a period of new construction. A railway, however, cannot store its product, transportation. Some car wheels must be moving all the time. It follows, then, that construction must yield to operation rather than operation to construction. Again, from the nature of a railway, construction is a component of operation, and the whole is greater than any of its parts.

During the period of rapid expansion the construction men were kept "on the front." Here is another bet that our predecessors overlooked. Instead of amalgamating construction with operation and developing a corps of all around men they sacrificed the future. The result is two sets of specialists lacking sympathy with each other's difficulties. The point of convergence is the company's treasury, which pays unnecessary bills. Sometimes these are in the form of a duplication of work train service; sometimes in idle equipment in which the construction bureau retains a proprietary interest on days of idleness. The construction people may be awaiting material or men. Meantime *my* work train cannot be used by the superintendent for maintenance purposes. The chief despatcher has so little sympathy with new construction that the young assistant engineer dare not let go of *my* engine lest *au revoir* may mean good-bye. Another delightful but expensive duplication occurs frequently in the matter of stores. Look around and see how many separate stores your construction bureau is maintaining, some of them within a stone's throw of a well stocked permanent store.

After defying a few times the official lightning our wise construction Ajax learns to make his estimates large. Having beaten his own figures he exclaims, "Behold how much money I have saved the company."

Comparisons of costs in construction work are much more difficult than in operation. This inability to control disbursement through the discipline of statistics should be met as far as possible by the most careful organization. Extravagance and waste in maintenance and operation are bad enough. In construction they are worse, because capitalized and bearing an interest burden for innumerable years to come.

All positions have their inherent temptations. The young engineer in charge of construction is tempted to nurse the job because when it is finished he may be laid off. Whether he yields or not, it is a poor kind of organization that places the temptation before him. Too frequently the construction engineer costs the company money because of his unfamiliarity with maintenance conditions. Experience in maintenance would help him in construction. Before being entrusted with authority an engineer should have experience in both maintenance and construction, regardless of the branch in which he may have happened to start. Check up your new branch lines and see how much money being charged to maintenance could have been saved if the construction people had better appreciated operating conditions. See how many side tracks and water tanks are on curves. Never investigate a collision without considering faulty construction and location as factors.

One of the easiest ways to save your company money will be to reorganize your construction activities. When you decide upon some new line, be it a branch, a second track, or an extension, call a cabinet meeting of all your assistants. Let the supply assistant of your grand opera troupe know at which stand you are to play. Call in the superintendent of the division concerned, with his maintenance assistant. Tell the superintendent that he will be responsible for the new work subject to the instructions of your construction assistant. Let it be understood that the work will be under the direct charge of his maintenance assistant, that the equipment will be looked after by his mechanical assistant and the material and supplies furnished by his supply assistant. Throw the whole official momentum of the division on the side of the new work. Under the old order of things the division people do what they are told in helping out the construction, but no more. The proposed organization will beget that extra individual effort which is relatively as profitable as the farmer's extra bushel per acre. At this same cabinet meeting let your superintendent nominate a junior assistant to act as understudy for maintenance while his leading maintenance man is treading the construction boards. If, when the job is over, any scrimping has to take place it will not be the construction man who has to drop back. Two years hence the maintenance assistant will not give you the old song and dance about poor construction causing excessive maintenance, because he himself built the line. There is, of course, a danger that this maintenance assistant will be extravagant in construction for the sake of a future record in maintenance. You have two checks against this, one through the efficiency of your construction assistant and the other through the division accounting bureau, which should handle additions and betterments as separate accounts.

Once upon a time I ran across a contractor grading a new line. His organization, the most efficient that I ever happened to see in any line of activity, made that of the railway for which he was working look like thirty cents. He made the grading camp the unit. Each of his sixteen camps was in charge of a foreman who controlled his own commissary, his own timekeeper, his own blacksmith and his own animals and equipment. The first duty of the foreman was to supply his men with grub and his animals with feed. Normally this took two wagons. If he happened to be near the base of supplies he used only one team and put the other on a plow or a scraper. If he happened to be clear at the front he might have to borrow another wagon and use three teams for supply. The point is that he kept all of his teams working all of the time and never ran out of supplies. The railway would organize a department of wagons, a department of plows and a department of scrapers, and the foreman who kicked the hardest would have the most grub, even though somebody else was short. These foremen were jacked up if they used poor judgement in accumulating supplies and had too much on hand when the next move came. No clerk at the base was allowed to cut the requisition of a foreman. The resident engineers of the railway in charge of the several staking and inspection parties could not procure railway commissary supplies without the O. K. of a clerk in the so-called boarding house department.

Another noteworthy feature was the constant presence of officials and sub-officials with authority to act for the contractor. A general foreman and two assistant general foremen were riding the line and giving instructions to meet changing conditions. For example, in the afternoon an assistant general foreman countermanded an order given by his general manager who had happened to be on the ground in the morning. When a resident engineer in charge of a party desired such authority he called up the tent of the division engineer and gained the desired information from the latter's chief clerk, who was receiving a smaller salary than the resident engineer. I spare your feelings a

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description of the complex methods imposed by the railway accounting department in marked contrast to the simple common sense practice of the contractor. How much stockholders are paying for maintaining the sacred system of railways I am unable to state. Many administrative crimes are committed in the name of organization.

One of the fallacies sometimes introduced by the accounting department in construction organization is to have all the timekeepers report to a chief timekeeper, regardless of the engineer or other chief of party. A bright young engineer once told me his troubles in this respect. He was astonished at the difference when he followed the advice to make each party a complete unit with its own timekeeper, the chief of the party being held responsible for proper time keeping as well as for all other duties. This efficient youngster deplored the fact that neither his engineering school nor his official superiors had ever deemed it necessary to give him lessons in the applied science of organization. Never forget, my boy, the immortal words attributed to George Stephenson that the greatest branch of engineering is the engineering of men.

Affectionately, your own, D. A. D.

RAPID BRIDGE WORK ON THE BOSTON & ALBANY.

BY W. F. STEFFENS,
Engineer Bridges and Structures, Boston & Albany.

Mention has frequently been made in the columns of the *Railway Age Gazette* of the extensive improvements now in progress on the Boston & Albany. Among these improvements, the company is replacing its lighter bridges with modern structures capable of carrying the heaviest known wheel loads. The specifications provide for Cooper's class E-60 loading, i. e., two 213-ton locomotives coupled, followed by a load of 6,000 lbs. per foot.

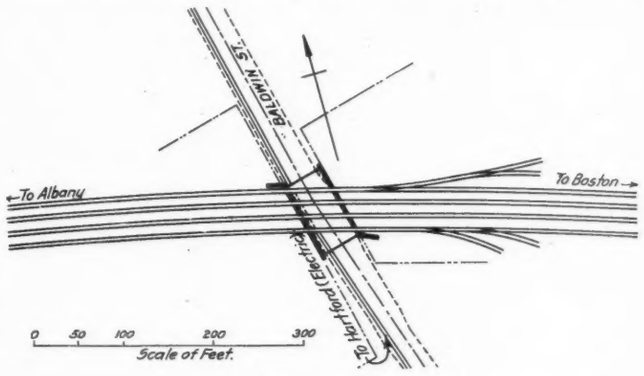
In the issue of May 5, 1911, the erection method followed in connection with the replacement of bridge No. 126, at Huntington, was described. The new superstructure was erected at the side of the old, and then the two spans simultaneously were rolled laterally, so that the new span occupied its final position and the old span occupied a temporary position from which it could be subsequently dismantled as convenient. The method of moving large masses on steel rollers has been in use for many years, as has its application to bridge work. On the Boston & Albany this method has been so perfected that the mere movement of the masses now requires but a matter of seconds, instead of minutes as elsewhere executed.

The latest and best example of the method was carried out last Sunday, October 1, at West Springfield, Mass. At this point are located the shops and one of the principal yards of the road. Baldwin street crosses beneath the railway at the extreme westerly end of the yard by a bridge known locally as No. 113A. The yard conditions render it imperative that the form of structure shall be such as to avoid any projecting steel work above the track level. The angle between the center line of location and the center line of street is about 60 deg., and the distance between street lines is about 42 ft. The depth of the floor possible for the bridge is limited by the surface of the street, which is about as low as possible at the present time, and by the elevation of the track, which is on about 0.51 per cent. grade ascending westward. The old superstructure to be replaced consisted of deck plate girder spans, three girders per rail, with a depth less than 1/15 of their span length. Under the heavy modern loadings, the deflection of these girders was an important consideration in deciding to replace them.

Considering these facts, together with the necessity for providing for the future extension of tracks over the bridge at such time as the yard may be extended, and the further consideration that maintenance of exposed steel-work should be eliminated as far as possible, a composite form of structure was selected. Deck plate girders form the basis of the design, but these girders are turned to lie at 90 deg. with the abutments, resulting in shortening the span. The original idea was to encase these girders in concrete, so that the resulting structure would resemble a slab and T-beam type. On account of the length of girders, 47 ft., it was finally decided to transform the concrete work into solid filling between the girders, placing in this filling sufficient steel rods to result in a series of reinforced concrete beams between the steel girders, although the steel-work was computed to carry the entire dead-load. Subsequent to the design of the concrete beams on this basis, a question arose as to the clearance between the bottom of the structure and the top of the street, which is used by a line of interurban electric cars. Rather than raise the question of changing the grade of the street to maintain the necessary under-clearance, the tracks were slightly raised at the west end of the yard and over the bridge, and a reduction of floor depth was made by omitting the concrete work below the angles of the bottom chords of the girders, and raising the reinforcing bars so that they lie between the girders, as shown in the section.

The girders are composed of web plates 38 in. x 7/16 in.; the flange angles are 8 in. x 6 in. x ¾ in.; and the cover plates are 14 in. wide. The girders are spaced about 2 ft. 4 in. center to center, except where vault lights pierce the slab to partly light the street below the structure.

Originally it was expected that the new superstructure could be erected in place, and that the concrete filling and waterproofing would be placed under traffic. Later, however, due to the experience obtained at other points on the road, it was determined to erect the new superstructure at the side of the old,



Location of Bridge.

in five sections. It was thought that, on account of being obliged to roll the sections into final position at a height sufficient to clear the masonry, the lowering of these slabs to avoid cracking would involve considerable risk, and that these slabs were possibly as large as could be safely handled. The intervening panels could be concreted and waterproofed after the main slabs occupied their final position on the bridge seats. The problem was further complicated by the fact that the grade of Baldwin street rises rather abruptly both sides of the bridge, and, to obtain clearance for the electric cars while the structure occupied the temporary position, it would be necessary to erect the slabs on a grade.

After the contract for the erection was let, the contractors were able to negotiate with the local electric car company to temporarily lower their tracks at the side of the street to obtain running clearance under the structure if erected nearly level in its temporary position. From this point, it was but a step to suggest the entire completion of the new slab with the exception of the ends of the girders, to enable the shoe plates to be placed on the masonry when the girders had reached final position. The important question as to by what method this unusually large slab could be lowered to final position on the abutments was solved by the sand-jack principle, applied in rather a unique manner.

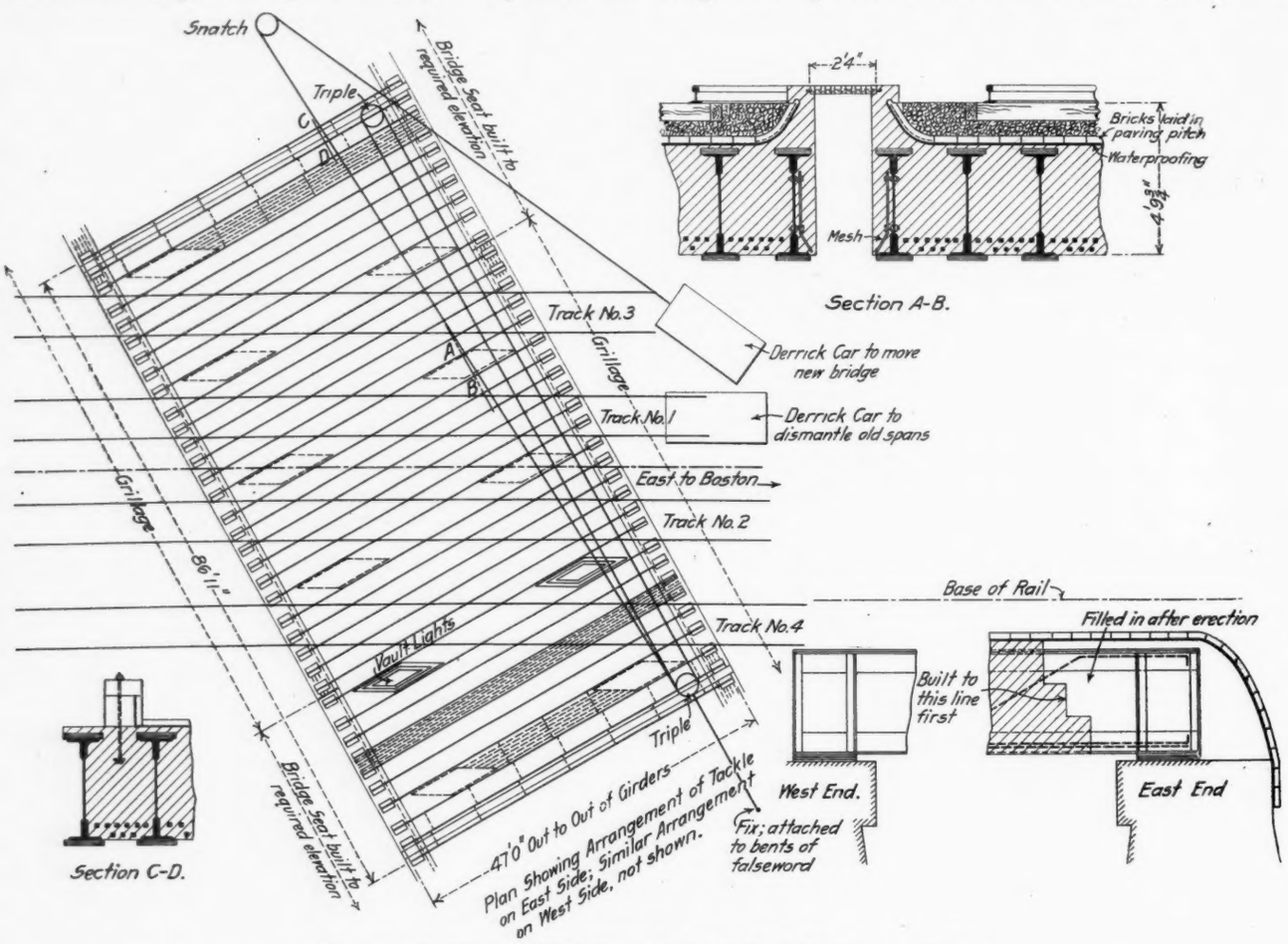
The falsework supporting the old bridge, and which later supported the new bridge in its final position, consisted of double bents at each abutment, upon which bents were placed the racks of rails and rollers. The sill of each bent was not seated direct on the ground nor on blocking, but was placed above another 12 in. x 12 in. timber sill, whose top was placed 6 in. below

the bottom of the main sill. In the intervening space, dry, clean sand was placed and confined in place by means of 8 in. x 16 in. timber stringers bolted to the faces of both sills. In erection, the false sills with the cheek plates attached were first placed on a carefully prepared foundation at exact elevation, and the open box thus formed was filled with sand to the correct elevation. The bents were then erected in the usual manner in this sand bed. Upon the completion of the erection work, these cheek plates were removed and the sand ran out, lowering the span to place.

Much apprehension was expressed in local quarters as to the possibility of moving into place a single slab weighing 1,500 tons, and lowering it to place without cracking. This, however, was successfully accomplished. The only evidence of a crack was at a joint caused between concrete placed at different dates on adjacent sides of a dividing line separating one day's work from another. At this point a very faint evidence of separation was noted, but this will be protected by the waterproofing coating.

In the moving of the span, some interesting features may be noted. In general, the method was similar to that described in the article mentioned above. The arrangement of tackle is indicated in one of the accompanying drawings. The operating department of the road abandoned, for a short time, the extreme north and south tracks leading to the yard and operated the yard entirely from the east end, so as to enable the removal of the girder span supporting those tracks over Baldwin street. As a test of the equipment, the slab was moved on Sunday morning to within clearance distance of the northerly middle track, which is the westbound main track. After the passage of the first regular passenger train—westbound—Sunday morning at 8:03, the rails were removed for that track and the girders were lifted to flat cars waiting on the eastbound main track just south of the westbound main track. The derrick car had been standing during this operation at the east end of the westbound main track. The slab was rolled in a southerly direction to a clearance distance from the last span of old girders remaining in place. After the passage of the Twentieth Century Limited [the B. & A. train which connected at Albany with the New York Central train] at 9:27 a. m., this last span of old girders was lifted by the derrick car clear of the new slab, which was run beneath it. The old girders were then lowered so as to rest upon the new bridge, which was then rolled into final position in about 15 seconds. The old span, thus mounted on the slab, was carried to one side, whence it could be loaded on flat cars and removed from the site.

Previous to the last operation, the track ties had been placed on the slab and blocked up to convenient height with 3-in. plank. When the slab reached its final position, the rails were placed in position and spiked. The ties were temporarily blocked over the exposed ends of the girders at the edge of the slab and the bridge was ready for traffic at 10:50 a. m. on the eastbound main track. The westbound main track was prepared for traffic a few minutes later. After the metal shoe plates were placed on the abutments and the span lowered to firm bearing on them, the open ends of the slab between the girders were filled with concrete, and the water-proofing was completed, ready for the ballast that replaced the temporary blocking.



Plan and Details of West Springfield Bridge; Boston & Albany.

The design and general execution of the work were under the direction of F. B. Freeman, chief engineer of the B. & A., and of the engineer of structures, and W. B. Knight, division engineer. The direct execution of the work was by the Lucius Engineering Company, Pittsburgh, Pa., F. J. Lucius, president, and H. D. Mason, general foreman, in charge in the field. Acknowledgment is also due to the co-operation of the operating department, J. L. Truden, general superintendent, and S. H. Clark, superintendent, for re-arranging traffic movements to accommodate the erection of the structure, and to the various members of the interested departments, whose efforts made possible the result.

Shop Section.

WE have been asked if contributors to the competition on the Benefits to be Derived from Convention Attendance, which closes October 15, must have attended conventions during the past summer. No, not necessarily. Any one who can testify as to the practical benefits derived from attendance at conventions is eligible. A first prize of $35 and a second prize of $20 will be awarded for the best two articles. Articles not awarded prizes, but accepted for publication, will be paid for at our regular rates.

SO many kinks were received in the competition which closed, September 15, that the judges have been unable to decide upon the prize winners in time for announcement in this issue. Ninety-two kinks were submitted by eleven contributors. Texas, Georgia, Kansas, Kentucky, Canada, Illinois, Ohio, Pennsylvania and New York each had one or more representatives. The supply appears to be unlimited for we have described almost 1,000 of them since the Shop Section was inaugurated.

AN error was made in announcing the results of the competition on Reclaiming Scrap Material in last month's issue. The winner of the second prize was C. C. Leech, foreman of the Pennsylvania Railroad at Buffalo, N. Y., and not J. S. Sheafe, as announced on the editorial page. Proper credit was given, however, in connection with Mr. Leech's article, which appeared on page 418 of that issue.

IT was interesting to note the interest that F. W. Brazier, superintendent of rolling stock, N. Y. C. & H. R., displayed in the Master Painters' Association during the last convention. And to be assured that this interest was genuine and permanent one need only to raise the question with a member of that association. His attendance at these conventions, which, by the way, is as regular as possible, adds a great deal to the value of the meetings. It shows the members that a man in his position appreciates the work of the Painters' Association and the difficult propositions which the master painters are up against. His talk to the younger men was very much to the point; the young painter could receive no surer tip to the road to success.

MORE and more attention is being given to safeguards and the prevention of accidents in railway repair shops and car repair yards. Splendid results have been obtained in many cases, but the number of accidents can be reduced to the minimum only when the men themselves heartily co-operate with the management by helping to keep the safeguards in good condition and by refraining from taking hazardous risks in order to save a few steps or make a few more cents per day. It is difficult to secure and hold this co-operation, for the men will at times be careless. The foremen must be watchful and alert at all times, both in watching for defects in the apparatus and for the non-observance of the rules governing the safety of the workmen. If the man at the head of the shop or department uses these precautions and draws the attention of the men to their importance, they will usually be impressed with the advisability of following in his footsteps.

THAT the railway painter is in rather a peculiar position can be readily understood by referring to the papers on the output of the passenger car paint shop, which are abstracted elsewhere in this issue in connection with the report of the Painters' Convention. They are the last men to work on the car before it is put into service, and if it is not delivered from the shop at the right time it is the prevailing tendency to get after the painter about it. He is subject to the delays of all the other departments that have anything to do with the repairs of a car. It is also up to him to make the car look respectable, and here again he is limited by the supplies given him, and in cases where he has to use what he can get, his hands become almost tied. That his true position is not altogether understood by his superiors was hinted at in the papers read during the convention. The painter should take considerable pride in his work, and that he does, there is no doubt. In this time of economy he has many things to consider in the line of substitutes for paint oils and turpentine. That these are being considered is well shown in the account of the convention. Of late years his troubles have increased considerably since the life of the recently introduced all-steel equipment is, to a large extent, in his hands. The painters sometimes wonder whether their troubles are duly comprehended by those above them. It is a matter that might profitably receive more consideration on the part of their superior officers.

WE have aimed to have kinks or articles of special interest to the boiler maker foreman in every Shop Section. This month we are especially fortunate in being able to present a description of the method of laying out a wrapper sheet for a locomotive tapered firebox, prepared by William H. Damon, foreman boiler maker of the Long Island Railroad. We trust that we may receive similar contributions from others of our readers who are particularly interested in the laying out of boiler work.

PAINT SHOP PRACTICE will be the subject of the competition to close November 15. It is purposely made as broad as possible in order that no paint shop foremen can excuse himself from participating. For instance it will include the painting of freight cars—both wood and steel. Have you a better way of handling this work than your neighbor? If so, how do you do it? Do you use a pneumatic painting apparatus for your freight cars? Is it better than hand painting? You may have designed some kink or more convenient way of doing certain classes of work, or you may have assigned the work or changed the organization in order to handle it to better advantage. Tell us about it. Then there is the matter of passenger car painting and interior finish, presenting an almost endless variety of subjects which might be treated to advantage. The sanding and decorating of windows is usually handled by the paint department. Very little has appeared in the technical papers regarding this class of work. We should like to know the details of handling it. The materials used in the cleaning of passenger equipment and the way in which the work is done may also be considered, for it is usually directed by the master painter, and if not properly done severely affects his work. The recent introduction of steel passenger cars has presented new and difficult problems for the master painter to solve, both as to the protection of the steel and as to the materials and methods to be used. What are the difficulties and to what extent have you solved them. These are only a few suggestions as to subjects which might be considered. Select the one that you are best qualified to write about and make your article clear and practical. A prize of $35 will be given for the best article, and one of $20 for the second best. Articles not awarded a prize, but accepted for publication, will be paid for at our regular rates.

THE forty-second annual convention of the Master Car and Locomotive Painters' Association might also have been called the forty-second annual reunion of the railway painters' families' for the feeling of brotherhood and relationship between the painters is no less marked than the comradeship and friendly feeling between the families and friends who accompanied them. There was a congenial, wholesome atmosphere throughout the

hotel during the time the painters were there. The wife of an ex-president remarked that this was her fifteenth convention, and that she had only missed one in the past sixteen years; many others could have equaled her record.

The meetings were conducted in a business-like manner and the program was carried out very smoothly. The authors of the papers took special pains to cover the subjects to the best of their ability and the marked improvements over last year's convention were unanimously declared to be in the reports of the test and information committees. W. O. Quest, as chairman of the test committee, should be especially complimented on the results of his committee's work. He showed the results of some twenty-eight experiments with different mixtures of paints and varnishes in which the value of various substitutes for paint oils and turpentine was demonstrated. It is to be regretted, however, that the report was so tied up to the specimens exhibited that it is impossible to publish a comprehensive abstract of it at this time.

The report of the information committee, of which H. Heffelfinger was chairman, was received with great satisfaction and was voted the best report ever presented by that committee. We hope that this record will be sustained, if not bettered, for through this committee the value of the association as an association can be strongly felt by all its members. It provides a means of solving the individual troubles of the railway painter, and should be used by every member. Such a committee should be considered by other mechanical associations, for through it questions can be more carefully and thoroughly answered than on the floor of the convention hall.

There are a few criticisms that can be made of the convention, and these are common to most other associations. The convention should be made, as Mr. Brazier said, a clearing house for all the troubles of the painter. There should be no hesitancy on the part of any one to get up and tell the difficulties they experience—and if any one knows of a remedy for such difficulties he should make it known at once. There is no possible excuse for anybody to fail in responding in this way, as it is for these very reasons that all the mechanical associations are in existence today. The papers should also be thoroughly discussed by *all*. Although it cannot be said that the discussions were not extensive, the number of members that participated in them should have been larger. Every one that is interested should have something to say.

The attendance at some of the meetings was open to criticism, especially since only one session was held a day, leaving plenty of time for inspecting the exhibits, improving acquaintanceship and interchanging ideas.

MECHANICAL ARTICLES DURING SEPTEMBER.

ARTICLES of special interest to our mechanical department readers that have appeared in the weekly issues of the *Railway Age Gazette* since that of September 1, and to which Shop Section readers may wish to refer, are as follows:

The Traveling Engineers' Convention. Editorial comment on the splendid work accomplished at this convention which was held in Chicago. September 8, page 457.

Workmen's Compensation. Abstract of the employers' liability bill which was passed by the last legislature of the State of Washington and which became effective October 1. September 8, page 465.

Traveling Engineers' Association. A 14-page report of the proceedings of the annual convention held in Chicago, August 29 to September 1. The more important reports and addresses which were considered are mentioned in the 12 following items. September 8, page 466.

The Duties of the Traveling Engineer. Abstract of an address made by Robert Quayle, superintendent motive power, Chicago & North Western. September 8, page 466.

Actual Demonstration versus Oral Instruction in Air Brake Operation. Abstract of a report and the discussion on this subject. Actual demonstration is of vital importance. September 8, page 466.

Practical Instruction in Fuel Economy. An important paper by V. C. Randolph, supervisor of locomotive operation, Erie Railroad. A saving of over $30,000 was made on the Allegheny division during the first year the new methods were applied. September 8, page 467.

Address by F. O. Melcher. Mr. Melcher emphasized the importance of the work of the traveling engineer whose duties bring him in direct contact with the men who actually operate the locomotives. He also told the supplymen how they might assist in preventing unwise legislation. September 8, page 470.

Mallet Compound in Road Service. Abstract of a paper presented by J. B. Daugherty, B. & O., and an account of the discussion. Mallets can be used successfully in through freight service and comparatively fast service, if properly designed. September 8, page 471.

Lubrication of Locomotives Using Superheated Steam. A committee report and an abstract of the discussion on it. Successful results are being obtained with high superheat, especially where drifting valves are used when it is necessary to shut off quickly or drift. The report considers the methods of lubrication, the lubricant and the packing and packing rings. September 8, page 472.

The Traveling Engineer and His Duties. Abstract of an address by T. A. Foque, general mechanical superintendent, M., St. P. & S. S. M. September 8. page 473.

Efficient Handling of Electric Locomotives. Abstract of a paper presented by S. A. Brickford, N. Y. C. & H. R. R. September 8, page 474.

Treated Water. An extract from a report on this subject presenting facts as to the loss of efficiency due to scale formation of different thicknesses and physical properties. September 8, page 474.

The Brick Arch. Abstract of the report and discussion on this subject. The advantages of the brick arch are outlined and tests are cited showing its effect on fuel economy and smoke prevention. September 8, page 475.

Efficient Management. An address by S. O. Dunn, editorial director of the *Railway Age Gazette*, on true "scientific management," and the part which such organizations as the Traveling Engineers' Association have in promoting it. September 8, page 476.

Automatic Stoker. Abstract of a report and the discussion on it. The Crawford, Hanna, Street and Strouse stokers were considered. September 8, page 477.

Automatic Fire Door for Locomotives. Description of the Shoemaker automatic fire door. September 8, page 483.

Boiler Circulation. Editorial comment on an article by H. B. MacFarland in the same issue. September 15, page 497.

Western Shop Employees. Editorial comment on the situation. September 15, page 498.

Women's Parlor Car for the Burlington. Illustrations showing the arrangement of these new cars which have a woman's reception room with a seating capacity of 15. Details of the steel underframe are also shown. September 15, page 501.

Brake Shoe Friction. Abstract of a paper on The Friction of New and Worn Brake Shoes and New and Worn Cast Wheels, which was read before the convention of the Air Brake Association, by A. S. Williamson. September 15, page 504.

Water Circulation in Locomotive Fireboxes. Description by H. B. MacFarland of a series of tests made on the Santa Fe to determine the relative merits of the circulation in Jacobs-Shupert and the ordinary type of fireboxes. It is difficult to make conclusive tests of this character and the conclusions drawn by Mr. MacFarland are based on the location of solids and suspended matter in the water spaces around the firebox. The tests and the theories evolved are ingenious, but it is to be hoped that it will be possible to make further and more conclusive tests. September 15, page 505.

Master Car and Locomotive Painters' Association. An account of the opening session and a list of the exhibitors. A complete account of the convention will be found in the issue of October 6. September 15, page 534.

Mountain Type Locomotive for Heavy Passenger Service. A completely illustrated description of this new type of locomotive and data as to the service results which are being obtained. They haul 10 to 12-car trains over a mountain division of the Chesapeake & Ohio, replacing 108-ton Pacific type locomotives which could only handle 6-car trains. They are equipped with Schmidt superheaters, Street stokers, and a power operated grate-shaking system. September 22, page 555.

Swiss Ambulance Car. Illustrated description of a car introduced by the Swiss railways, and arranged for use over all the railways of Europe, in which sick or invalid persons may be comfortably transported over long distances. September 22, page 559.

Heavy Mikado Locomotives for the Illinois Central. Fifty of these locomotives have been received for handling coal traffic. They are equipped with superheaters and have 30 per cent. more tractive effort than the consolidation locomotives which they replace. September 29, page 585.

Scientific Development of American Railways. S. M. Felton, president of the Chicago Great Western, prepared a paper on Scientific Management of American Railways for the Congress of Technology, held in Boston last April. Extracts are presented, showing the growth of traffic on the Pennsylvania since 1865; also the development of the freight and passenger locomotives during the same period. September 29, page 586.

Tonnage Rating of Locomotives on the Burlington. A thorough description of the methods used, as described by M. H. Wickhorst in Bulletin 138 of the American Railway Engineering Association. September 29, page 592.

Concrete Engine House; Elgin, Joliet & Eastern. The house has 17 stalls, and was recently erected at the new terminal at Joliet, Ill. September 29, page 597.

Letters to the Editor.

EFFICIENCY.

Vallejo, Cal., July 22, 1911.

To the Editor of the Railway Age Gazette:

The scientific management of railway shops means, I suppose, the saving of unnecessary waste in time, money and material; or in other words, decrease the cost, and increase the output. Every employee in the shops that I have worked in, has had to make out a time card at the end of each day, showing the time he started and stopped each job. Now why not introduce another card on which each man could and should show how and why time, of say more than 5 or 10 minute periods, was lost each day, in the same way as making out the timecards. This would in certain cases show up lazy men as well as poor tools, and when such losses are added up, they certainly would amount to something worth further investigation, and consequently call for remedies. Many methods and systems would be considerably changed, because the officials would come to know of things that they were not aware of.

If a man has to run two and three times to the tool room for a tool before getting one that will work, or has two run two, three or more times during the day to get his hammer-shafts repaired, do you suppose that the officials will not try to remedy such matters? As it is now, when a man complains, generally no one pays any attention to it, but if half a dozen or more such items are reported every day, they will be noted. Why not give each air-tool, such as a motor, or hammer, an official number and note the work that each tool does; it would not be a hard matter to hand in a slip with each tool taken from the tool room, making thereon the time that the tool was issued. The workman could give his name or number; also what work and how much work he did with the tool before returning it; the time that the tool was returned should also be marked, and the slip then deposited in a box, which should be locked so as to prevent any tampering with these reports.

What good will it do? Not very much perhaps, however, if there should be a shortage of tools, you would have a record of where the tools were, and of what use they were, and it is quite possible that a man will be more likely to bring back the tool as soon as he has finished his work with it. The output of each tool could be easily traced and compared with the output of other tools; in this way the loafing tools could be found out. I have had motors of the same make and size, where one would drill a 1 in. hole in less time than another would drill a ½ in. hole through the same thickness. I have handled a variety of hammers in which the output ranged all the way from 2 to 6 and even more; again there are tools that are in the hands of the repairer very often, and there are also those that require repairs very seldom; if these tools were debited with all repairs and troubles they give, and credited with the work they do, I am sure the officials would not worry so much about incompetent and lazy workmen, as about useless tools.

Most of the letters and articles on scientific management deal with the question of how to increase the output of the workmen—why not rather try and increase the output of the machines? If a punch makes 60 r. p. m., what's the use of asking the man to punch more than 60 holes per minute? Or if a drill press can drill a 1 in. hole 1 in. deep per minute, how can the driller give you better results? Find out the maximum work a machine can do, then reduce this to a practical minimum and insist upon every man giving you this minimum and no less, then you will know whether a man is doing his work or not, that is the men attending to the machines, which practically will account for about one-half the men in a shop.

If a man wants to go in for scientific management, he of necessity should know all the factors that go to make up his expenditures, which will not only be the cost of wages and materials, but also the cost of power to run the machinery of his shop, besides the cost of lighting, heating and ventilating. For the modern electrical driven shop, it is easy to ascertain beyond a doubt the actual costs of power by merely installing a meter in each shop. The next step then would be to ascertain the power necessary for each machine, and then the value of each machine can be known, as far as expenditure is concerned. It certainly would not be a bad plan to debit each machine with all its costs for running, repairing and maintainance, and also credit them with the value of the work done—similar to the accounting of engines on the road in service. Of course it will take a little outlay of money to keep track of all those matters, but then I am sure it will pay if the systematizing is done thoroughly and started by a competent man; later on an ordinary clerk will be quite able to attend these duties.

I have worked in a large railway car factory, building and repairing all sorts of cars, from the private cars of the Czar down to the humblest box and flat car; also oil tanks and tramway cars. There the power to each shop was measured, every machine had its minimum output fixed, and every attendant had to work piece-work. He could make as much as he wanted to or could—above the minimum—but under no consideration was he permitted to fall below the minimum, without being required to give a satisfactory explanation as to why he could not make this minimum (and a pretty tough minimum it was, so that you could not do much visiting); to allow a machine to run idle, was almost a criminal offense; if you wanted to loaf a bit, first set your machine idle, then loaf, were the orders. All the machinery was kept in first-class shape and the repairs and expenditures together with the work performed were kept as accurately (or even more so) as the wage accounts. Things that could be done there, can be done in a railway shop.

Frederick F. Zepp.

ENGINE HOUSE EFFICIENCY.

Winnipeg, Man., September 6, 1911.

To the Editor of the Railway Age Gazette:

Why not give the engine house foreman a better chance to work on the efficiency problem? If there is one part of a road that should have modern equipment in every way it is the engine house. Yet there are houses in operation on old established roads at the present time where it is necessary either to hold an engine out of service while a part travels two or three hundred miles to be turned or bored at a back shop, or some very slow and expensive maneuvers have to be made with the available machinery to handle the work. While it may be creditable for a foreman to get out of a difficulty by makeshifts, it should not be necessary; his ingenuity can be much better exercised in other ways.

On many roads the purchasing department could do a lot to improve shop and engine house efficiency. In walking through an eastern engine house in company with the foreman a short time ago, the writer noticed a blacksmith making a number of small bolts. When asked if he found it difficult to keep his blacksmith busy, the foreman pointed to a pile containing enough work for at least ten days, and replied: "I have had bolts of that size on order for three months and have been drumming up the purchasing people for weeks to get them here. They are probably haggling over a small reduction in price, while I am wasting dollars making bolts by hand."

Then there is the cutting off of requisitions of material that is very likely to be needed. How long will it take the higher officers to learn that a foreman who is worthy the name should be trusted to order his own material? A common reply to such a question is that foremen are not careful and that they are very commonly addicted to duplicating orders. Then why not give them clerical assistance

enough and of the right quality to insure against duplicating orders? The average engine house office is below any reasonable standard of clerical help. Give the foreman a chance and reduce the activity of the blue pencil, the all-too-frequent result of which is that broken parts for which repairs should be in stock have to be expensively patched up, or new ones made at great expense, or else the engine is held out of service while the repair part is sent for. Under such circumstances a foreman has often to spend time working out some method of getting out of the trouble that could be much better employed for other purposes. It is common practice to have staff officers who are relieved from any direct duties and spend their time in developing betterment schemes. Give the engine house foreman better help, better equipment (as some of the large roads are doing) and reduce the activity of the blue pencil, and thus give him a chance to use his thinking powers in developing methods of more efficient operation.

A. C. LOUDON.

SHOP KINKS.

BY F. RATTEK, BRIGHTON, MASS.

REMOVING RUSTY AIR PUMP BOLTS.

Engine house repairmen often experience considerable difficulty in removing rusty bolts on air pumps, and much time is sometimes lost due to the breakage of the heads of the bolts, necessitating the drilling out of the bolts. An ordinary ratchet and "old man" are not at all convenient for performing this operation, especially as it often has to be done in poorly lighted places; if the drill is not started right the bolt hole threads will

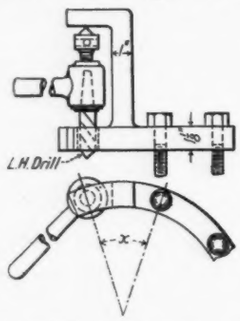


Fig. 1—Device for Drilling Out Broken Air Pump Bolts.

be ruined. To overcome this difficulty the device illustrated in Fig. 1 was designed. The holes are provided with hardened bushings and the distance between them is the same as the standard distance between the holes on the air pump head. The device is clamped in place by two of the stud bolts that have already been removed. A left-hand drill is used, and often the bolt will start before the drill gets half way through.

BOLT DIES.

A cheap and useful die for cleaning burrs off of bad threads or bolts is shown in Fig. 2. It can be made by filing two grooves

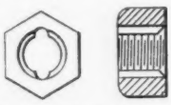


Fig. 2—Die for Running Over Damaged Bolts.

in a standard nut, as shown, and case hardening it,; or better still, by using a machine steel nut and hardening it. It will pay well to have a plentiful supply of these dies on hand.

SIDE ROD BUSHINGS.

The usual practice when a side rod bushing wears and there is too much play on the pin is to remove the bushing and force it back in with a liner, thus closing it up and making it a neat fit on the pin. When new the bushings are usually turned straight from end to end on the outside; if care is not exercised when they are being pressed in, they will start at an angle and the bushing will never give good service. In order to prevent this the bushing should be formed on the outside as shown in Fig. 3. The part marked *X* should be the same size as the hole in the rod, or from .001 in. to .002 in. smaller, thus allowing the bushing to start in properly. On the drawing the difference

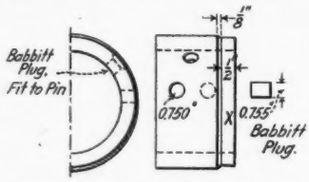


Fig. 3—Side Rod Bushing.

between the diameter of this portion and that of the main part of the bushing is exaggerated in order to convey the idea. Because of the difficulty in replacing babbitt in a bushing, it is often let go without any and consequently is back for another overhauling long before it should be. Drill two or three ¾-in. holes through the bushing and drive in a plug of babbitt of the dimensions shown on the sketch. The plug should be headed over tight and will not loosen and will have a perfect bearing on the pin.

PORTABLE PRESS.

A handy press for use in an engine house where considerable repairs have to be made is shown in Fig. 4. It consists of an ordinary hydraulic jack clamped on a cast steel base. This base is arranged to take two wheels at the rear and one leading wheel, as shown, making the apparatus portable. The uprights and the top crosspiece are constructed of wrought iron. A bracket is placed at the rear, which is fitted with a wheel so that for such work as forcing in a new crank pin the device may be placed in the upper right hand corner of the illustration, as shown.

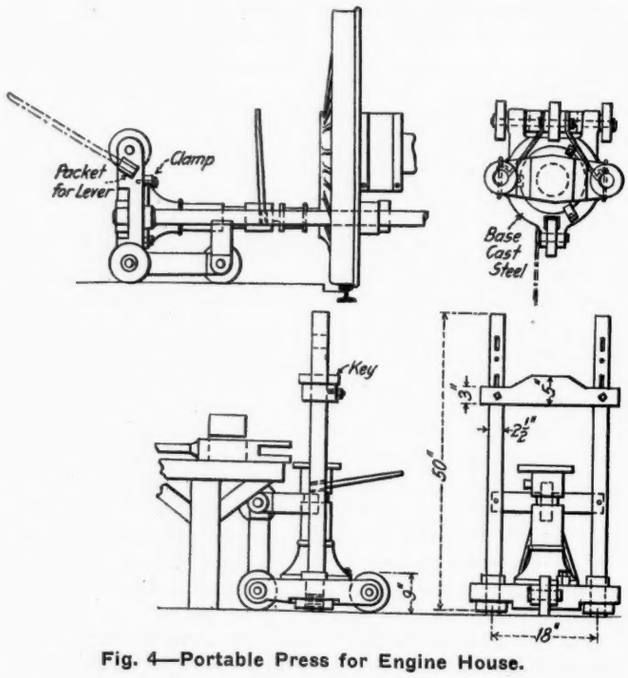


Fig. 4—Portable Press for Engine House.

When the device is used for this purpose it has one fault, and that is that every 30-ton jack will not have 6 in. of travel and the ram will have to be pushed back after making a 3-in. movement, and a block used to push the pin the remaining 3 in. To obviate this difficulty, it is well to properly mark a jack which will give the necessary travel so that it can be used in the press and be depended upon in an emergency.

THE TRAINING OF THE APPRENTICE.*

BY LE ROY W. ALLISON,
Los Angeles, Cal.

Nothing is more natural than for the graduate apprentice to wish to remain among surroundings with which he is familiar, among associates he knows and at work following methods of operation in direct accordance with his training. If he does leave the shop it is usually on account of wages; he has his own welfare to consider, he has himself to care for, and if, at the end of a four-year course of apprenticeship at a minimum stipend, he is still to receive compensation far below that given the journeyman in that shop, he is bound to look elsewhere. The railway justly holds that the boy is indebted to it for his knowledge of the trade, if it is properly taught, but such indebtedness should expire at the close of the term. A balancing of accounts should show in favor of the railway. The instruction given and the results attained ought to show a condition of productive investment, rather than one of profitless expense. Is not an apprentice, after having served his time, more valuable, or at least of equal worth, in that particular shop, to the journeyman employed from other sources?

Considerable cause of dissatisfaction among the young men and apprentices may be attributed to the correspondence schools. Although it is conceded that their courses of study have assisted many to advance and have proved excellent in their way, their publicity methods, which tend to depict the machinist and shop employee as a menial of very inferior rank, with such references as "are your hands tied," "are you one of the bunch," and the like, imbue the student with the impression that it is easier to act as a mechanical or electrical engineer, than to undergo a course of shop training. Time proves that these ideals require a little more than "home study," and that practical experience is necessary.

A few of the large railway systems have adopted courses of study and instruction for the apprentices which promise effective results. Observation of apprenticeship work in the more modest establishments indicate that the methods employed in many might easily undergo treatment for improvement and offer greater opportunity both to the shop and the apprentice. Placing boys under the direct charge of the foreman in the shop and giving them meagre and inefficient class-room work coupled with a formidable contract and scanty wage scale will fail in being productive of the desired results.

Selection of Apprentices.—Not all of the applicants for railway apprenticeship instruction are fitted for the work; they cannot do justice either to themselves or to their employers and will not only prove a loss to the latter, but will tend to retard the development of their associates. The apprentice should be carefully selected; his record should be investigated as to character, general inclinations and manifest ability. The object must be to obtain an apprentice who can think for himself, who will not learn by rote, who will display initiative, and who will from all appearances develop into an efficient workman—one to be depended on. The entrance examination should be one that will bring out those essentials which we must have knowledge of in the would-be apprentice, and which will tend to exhibit any special qualifications and adaptability for the work, rather than laying too much stress on his elementary learning.

The class of apprentice desired is not as difficult to obtain as many would have us believe. The writer has seen and knows boys of the proper sort who are only awaiting a chance for a "square deal" with a wage scale that will afford a little semblance of self-support. It is far better to have a small allotment of promising material that is to prove valuable to the railway, than a large aggregation of questionable worth. When we realize that we should not expect too much of raw material, and that we should encourage, assist, and develop the highest and best traits in the boy, consider his well-being, deal with him honestly and offer financial support in accordance with his ability and value to us, we will not only create a profitable asset to our business, but will inspire the boy with the desire to make a competent workman and a good citizen. When we select an applicant we must put him a little on his honor, and not offer him a contract to sign which is too one-sided and stringent; one that we would hesitate to accept ourselves in like position.

Instruction.—The boys should be placed under the direct supervision of a competent instructor, who is fully equipped for his work and will feel a personal interest in his students. Regularity and order must prevail and the apprentice should be impressed with their value. Work in the shop should be supplemented by work in the class-room. The class-room periods should occur at regular intervals and be brief. Instruction papers compiled for a particular apprenticeship course in a railway shop and prepared by an able and broad-minded instructor are to be preferred to any textbook. The drafting work should as far as possible, be done in connection with actual models.

The apprentices should not be left to the foreman in the shop; he has not the time and usually lacks the patience to obtain the greatest degree of efficiency possible from apprentices. An instructor should relieve the forman of this duty, reporting directly to him and issuing his orders to the boys. He should be thoroughly practical and have the ability to explain and demonstrate the best methods of operation effectively. Allowing the older apprentices to act as instructors occasionally will prove advantageous, showing the fitness of the former to act independently. The product of the apprentice, after a short period of instruction and aid in the proper handling of tools and the correct methods of operation, should soon begin to more than pay its cost to the company and show a profit.

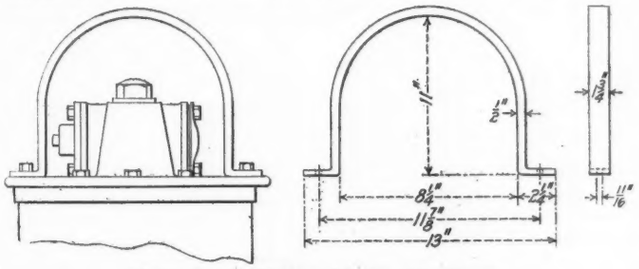
Graduate Apprentice.—The graduate apprentice should be thoroughly equipped to engage as a journeyman. He should understand the value of discipline, the moral obligations attached to a position of trust and that the class of men desired are those who can produce maximum results. The bonus plan, offering a suitable pecuniary return at the successful completion of a course, has many admirable features to recommend it. The graduate apprentice is open to two alternatives—to stay or to go; if he is no longer treated as an apprentice, if his basis of wages is proper and equivalent to wages paid in other plants, he will be more than likely to remain.

*Entered in the competition on the instruction of apprentices and workmen which closed April 15, 1911.

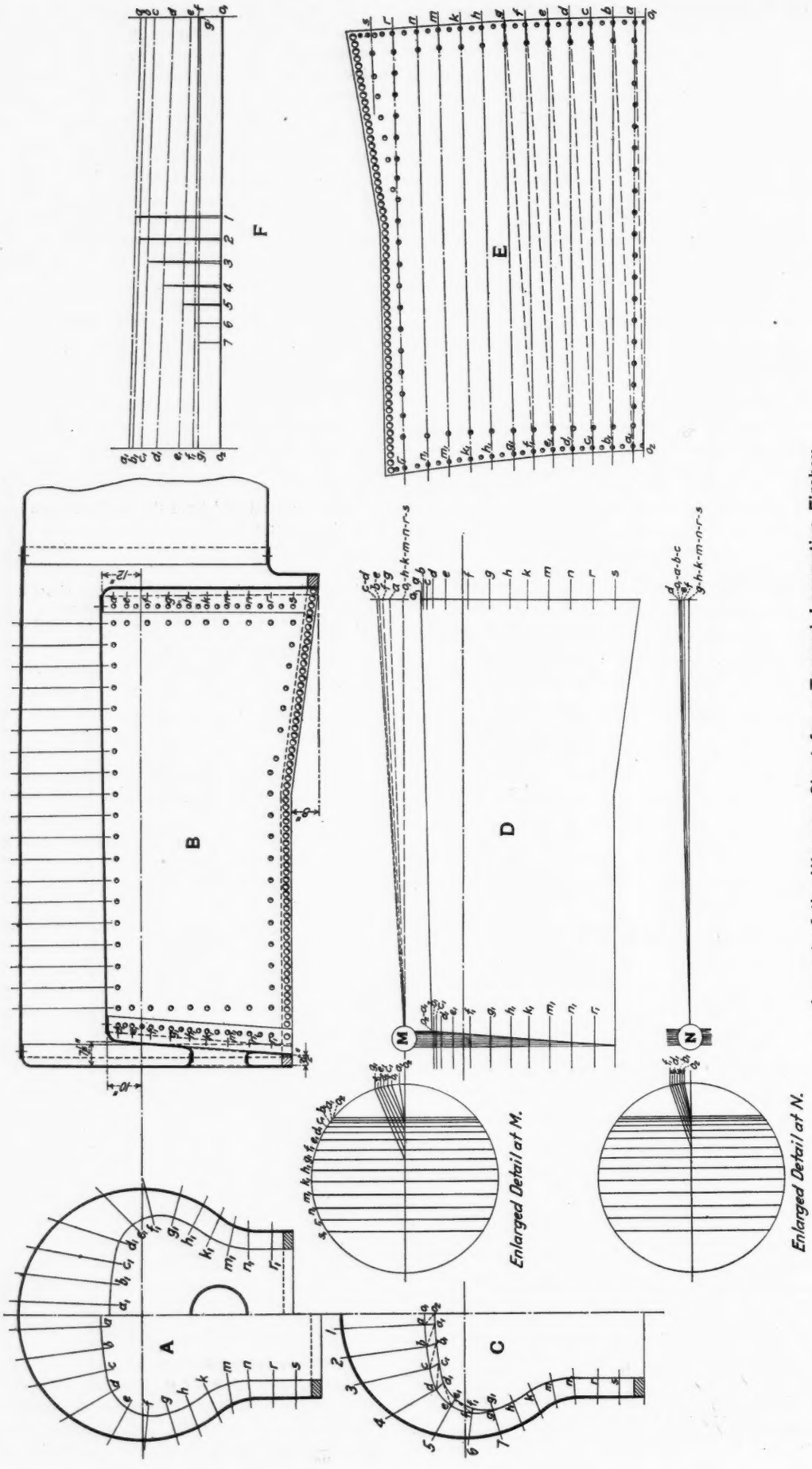
YOKE FOR LIFTING AIR PUMPS.

BY F. W. BENTLEY, JR.,
Chicago & North Western, Huron, South Dakota.

A safe method of applying air pumps to locomotives is by means of the yoke shown in the accompanying illustration. It is made of strap iron, 1¾ in. wide x ½ in. thick, arched 11 in. above the head and fastened to the pump by the cylinder head studs as shown. By the use of this arrangement better facilities are provided for lifting the pump, and greater safety is afforded the workmen. The method of lifting the pump by means of a chain or eyebolt is cumbersome and dangerous, as the chain is liable to slip; it usually interferes with the application and the eyebolt is apt to pull out after being used several times.



Yoke for Lifting a 9½-in. Air Pump.



Lay-out of the Wrapper Sheet for a Tapered Locomotive Firebox.

LAYING-OUT WRAPPER SHEET FOR LOCOMOTIVE TAPERED FIREBOX.

BY WILLIAM H. DAMON,
Foreman Boiler Maker, Long Island Railroad, Richmond Hill, N. Y.

Usually once in the life of a locomotive boiler its firebox must be renewed. In doing this it is not sufficient to follow the original drawings, for many times considerable variation is found, especially when a mistake has been made in the original layout, in which case every effort is made to hide it by building the rest of the boiler to fit. The writer found a case where one side of the firebox conformed to the drawing, but the other was totally different, this being made necessary by a careless mistake in the original layout.

In the case in question, *A* and *B* represent the boiler drawing, the crown sheet having a drop of 2 in. throughout its length. *C* is one-half of *A*, showing also the contour of the back edge of the wrapper sheet. It will be noticed that the front and back contours coincide at *g* and continue on as the same line to the mud ring. *D* is the outline of the wrapper sheet taken from *B*, O_2 O_1 representing the exact length of the top center line of the wrapper sheet. The ends of the rows of staybolts are located by projecting over from *C*, and are noted at both ends as shown.

A base line is then drawn above *D* parallel to the center line of the boiler and to that line are projected the points O_2, a_1, b_1, etc., from *D*. An enlarged detail of the area *M* is shown where they intersect with this parallel line, to make the description clearer. The point O_1, on the right end of this line, is projected up from *D*, and at O_1 a perpendicular is drawn. On this perpendicular lay off the distance O_2 *a*, as shown in *C*, from O_1. This gives the point *a* on the perpendicular; also lay off a_1, *b* (taken from *C*) from O_1 which gives point *b* on the perpendicular. Follow this same process until all these dotted diagonals shown in *C* are measured off. From *h* on, the horizontal lines of the staybolts are parallel to the center line of the boiler so that they will coincide with the base line of this diagram. Now the distance from where the line projected up from the back end of *D* intersects the base line at *M*, as for instance e_1, to the point *f* on the perpendicular gives the diagonal distance between e_1, on the back of the sheet, and *f* on the front end. This will be used later.

Next; below *D* draw a base line parallel to the center line of the boiler and project down the points O_2, a_1 b_1, c_1, etc., the enlarged detail at *N* being shown—as at *M*. From the front end also erect a perpendicular as in the previous case. On this perpendicular lay-off from its foot the distance O_2 O_1, a_1 *a*, b^1 *b*, etc., taken from *C*. Now a line drawn from the point of intersection at *N* of, say c_1, to the correspoinding point *c*, on the perpendicular will give the exact length of the sheet along that line of staybolts. With these two sets of triangles and the drawing *A* the sheet is ready to be layed out.

Lay-out of Sheet. The lay-out of one-half the sheet is shown at *E*. First—draw a center line O_2 O_1, which may be taken from the drawing *B* or from the lower set of triangles. O_2 is the back end and O_1 the front. With O_2 as a center, scribe an arc with a radius equal to O_2 a_1 (drawing *C*) and with O_1, as center draw an arc with a radius equal to O_1 *a* (drawing *C*). Now with O_2 as center, scribe an arc with a radius equal to O_2 *a*, taken from the set of triangles above *D*, intersecting the arc scribed from O_1. This will locate point *a* on the front edge of the sheet, which is the front end of the line for the first row of staybolts. Point a_1 at the back end of the first line, is located by taking *a* as a center and scribing an arc, with a radius equal to a_1 *a*, taken from the set of triangles below *D*, intersecting the small arc drawn from O_2. By following out this same method with the remaining points, the wrapper sheet is layed out in its development, the bottom or mud-ring end being put in from the drawing *B*. The stays are also located from *B*.

The drawing *F* shows the angle that each row of staybolts, 1 to 7 inclusive, makes with the wrapper sheet. To find the angles, draw the line o_2 o_1, representing the outer shell of the firebox. At each end of this line erect perpendiculars and lay off from o_2, the distances between the outside and inside sheets at the back end and from o_1, the corresponding distances at the front end, these measurements being taken from drawing *C*. Connect the points a_1 and *a*, b_1 and *b*, etc. These lines give the relation of the outside sheet to the inside sheet at the different rows of staybolts. Erect perpendiculars to these lines from the line o_2 o_1, then draw perpendiculars to the lines a_1 *a*, b_1 *b*, etc., from the points where they are intersected, and the space shown on the outer shell line gives the distance the staybolts have to be moved forward in the wrapper sheet or backward in the outside shell sheet. The rows of staybolts beyond 7 are straight, so no allowance has to be made.

Lay out the rivet holes in the wrapper sheet for the flue and door-sheet seam with about a 2 in. pitch. After this is done, take two strips of soft iron the same thickness as the wrapper sheet, about ¾ in. wide and long enough to take half the rivet holes from wrapper sheet. Bend the strips edgewise to the contour of the line that the rivet holes are laid off on and mark the holes on the strip, centering them with a prick punch. Now bend the strips flat-wise to the contour of the flue and door sheet as on plan *A;* draw the circumferential lines on the flanges of both sheets with a center line on top. Put the strips on and hold them with a small C-clamp as close to the sheet as possible. Now mark the rivet holes on the circumferential line that has been drawn on flange, This will lay out correctly rivet holes, also the last hole will locate the line for the front and back rivet holes in the mud ring. To lay out the side rivet holes in the mud-ring square down from the first straight row of staybolts across the mud-ring rivet line; using this point for a center will make the exact location of the rivets correspond with the staybolts.

ANNEALING ROLLED AND FORGED CARBON STEEL.*

The usual purpose in annealing miscellaneous forged or rolled carbon steel objects is to remove existing coarseness of grain. This removal is brought about by heating the object to an annealing temperature, which varies with the carbon-content of the metal. The rate at which the object cools from this annealing temperature influences its properties very profoundly, and hence this rate of cooling should be suited to the duties which the object has to perform in service, and to the properties which we seek to give it. Under certain special conditions annealing is required in order to remove, not only coarseness of grain, but the effects of rolling or otherwise working the metal at a temperature so low as to set up serious internal stresses. Appropriate treatment for these conditions will be given later. As the following specifications are intended to apply to a great variety of miscellaneous objects, they are purposely made suggestive rather than mandatory in many respects, because no single set of rules can be applied rigorously to such widely varying classes of objects and purposes.

Annealing for Removing Existing Coarse Grain.—In the case of large objects, where the heating of the interior lags behind that of the outside, although the early part of the heating may, if desired, be rapid, the final approach to the annealing temperature aimed at should be slow, so that the interior may be brought fully up to it without carrying the exterior far beyond it, because in general any needlessly high temperature is injurious, and tends to recoarsen the grain. An exposure of one hour for pieces 12 in. thick should be long enough to insure a thorough annealing; thicker pieces need longer heating.

For all important work in careful hands the use of some trustworthy pyrometer is strongly recommended, but most pyrometers

*Abstracted from the report of committee A-4, Dr. H. M. Howe, chairman, presented at the Atlantic City convention of the American Society for Testing Materials.

should be checked up frequently against some standard, and it is safer to rely on a trained eye than on an unchecked pyrometer. The temperature which most pyrometers indicate is one between the temperature of the outside of the object heated and the temperature of the flame which is supplying the heat. The pyrometer should be in immediate contact with the object, and should be protected from the flame or other source of heat by a suitable insulation, as, for instance, by covering it with sand. In important cases the gas or other sources of heat should be shut off for at least ten minutes before taking the observation.

When relying on the eye, the light surrounding the furnace should be dull, and should be kept as nearly constant as practicable, in order that the eye may not be misled by the changing contrasts. Direct sunlight should be excluded, and any arc and other strong lights should be so placed that neither they themselves nor any concentrated part of their light shall be in the field of the operator's sight at the time of observation. Allowance should be made for the brighter surroundings by day than by night, and on sunny than on dull days.

The annealing temperature for steels containing between 0.50 and 0.90 per cent. of carbon is that at which the metal suddenly ceases to be magnetic. In general the higher the carbon-content the lower should be the annealing temperature. Further, in order to bring the interior of large objects up to an effective annealing temperature their outside may often be raised advantageously somewhat above that temperature. The following ranges of temperature should be used for the several ranges of carbon-content indicated. They refer to the usual moderate manganese-content. For steels with a manganese-content greater than 0.75 per cent., a slightly lower temperature will suffice.

Range of carbon-content.	Range of annealing temperature.
Less than 0.12 per cent.	875 to 925 deg. C. (1607—1697 F.)
0.12 to 0.29 per cent.	840 to 870 deg. C. (1544—1598 F.)
0.30 to 0.49 per cent.	815 to 840 deg. C. (1499—1544 F.)
0.50 and over per cent.	790 to 815 deg. C. (1454—1499 F.)

Care should be taken that all parts of the object reach the same temperature. To that end it may be necessary to mask from the heat, by means of bricks, the thinner part of objects of varying thickness. When the heating is nearly finished, these bricks may be removed. The flame should never be allowed to touch any part of the object under treatment. After the object has been held long enough at the annealing temperature to make its temperature nearly uniform throughout, and to complete the refining of the grain, it should be cooled so as to give it the properties needed, and in a way appropriate to its carbon-content. The general practice is that the higher the carbon-content the slower should the cooling be; and that the slower the cooling the softer and more ductile the metal will be, the lower will be its tensile strength, elastic limit, and yield point. Objects containing more than 0.50 per cent. of carbon should cool slowly—till the color dies out, say at 500 deg. C. (932 F.), as, for instance, by leaving them in the furnace. They may then be removed and cooled in the air. Further, thin objects containing between 0.25 and 0.50 per cent. of carbon should be treated like those of 0.50 per cent. of carbon, unless they can be so massed together that their collective bulk will retard their cooling, so that they will collectively cool even in the air with moderate slowness, like single large objects.

In cases where special qualities are desired the following methods may be used. To give the greatest softness and ductility of which metal is capable, even at a certain sacrifice of strength and elastic limit, as is wanted for easy machining or to resist a small number of severe distortions, the metal should be cooled slowly, either within the furnace, or in the case of large objects, under a cover of lime, clay, or other slow conductor of heat. But for most cases for which even unusual softness and ductility are required, it suffices to remove the object from the furnace when it has become dead black, and to cool it thenceforth in the air.

To give great tensile strength and high elastic limit even at a certain sacrifice of ductility, the cooling should be more rapid, the rapidity to be governed by the thickness and carbon-content of the object. Thin objects and those with high carbon-content can not stand so rapid a cooling as thick and low carbon ones, lest their ductility be too far sacrificed. For instance, thick objects with less than 0.50 per cent. of carbon may be cooled completely in the air, of course, protected from rain or snow. Objects with 0.50 per cent. of carbon or more, and thin objects with from 0.30 to 0.50 per cent. of carbon may be cooled in the air if their cooling is somewhat retarded, as for instance by massing them together, as happens in the case of rails.

To give an unusually high combination of ductility with tensile strength and elastic limit, water or oil is used for quenching and annealing. This process needs great care and intelligence, and should in general be used only by those familiar with high-grade steels. After holding at the annealing temperature suited to the particular steel, as previously indicated, the object is quenched in oil, which should be kept in circulation. It may be quenched in water if its carbon-content is so low and its shape so simple that it is not in danger of cracking or receiving permanently harmful stress. In any event the danger of such cracking and stress is lessened by removing the object from the oil or water before it has cooled completely, say, when its temperature has fallen to 160 deg. C. (320 F.). The steel thus hardened should next be annealed by heating, within a very few hours of the quenching, to a temperature suited for giving the properties needed. In general the higher this annealing goes, the more ductile will the steel become, and the lower will be its strength and elastic limit.

For very high elastic limit and tensile strength, anneal at 500 deg. to 600 deg. C. (932-1,112 deg. F.). In this case the ductility will be low. (Watch-spring steel is only annealed to 350 deg. C., but no commercial steel below 500.)

For intermediate tensile strength, elastic limit and ductility, best suited to the majority of cases, anneal at 600 deg. C. (1,112 F.).

For the greatest ductility, with good strength and elastic limit, anneal at from 725 deg. to 750 deg. C. (1,337-1,382 deg. F.).

The object should be held at this second annealing temperature long enough not only to allow its interior to reach it, but also to relieve the stress given in the water or oil quenching. For pieces of moderate thickness a four-hour exposure should suffice.

A moderate increase of strength and elastic limit above that given by a simple slow cooling, without the full sacrifice of ductility which a simple air cooling would cause, is obtained by hastening the cooling till the object is at a dull red (say, 650 deg. C. or 1,202 deg. F.), and henceforth cool slowly. The hastening of the cooling may be brought about in the case of thin objects in relatively shallow furnaces by opening the furnace door till the temperature falls to dull redness; or by running the objects out into the air on a movable car bottom, and returning them to the furnace when they have cooled to a dull redness; or even, in the case of objects with not over 0.30 per cent. of carbon and not too thin, by a temporary immersion in oil or even water, followed by a return to the furnace. In cases in which such operations are to be performed frequently, special unfired chambers may be used for the final slow cooling, thus leaving the annealing furnaces proper available for their regular work. The results obtained in this way are not so good as those had with the method of grouping.

Annealing to Remove the Effects of Rolling.—When annealing to remove the effects of rolling or otherwise working the object in the cold or at any unduly low temperature, the object should be heated to about 775 deg. C. (1,427 deg. F.) and cooled with a slowness which should increase with the thickness, i. e., the least dimension of the piece. In the case of thin plates a mere heating to 725 deg. C. (1,337 deg. F.), followed immediately by slow cooling, should suffice. In the case of thick forgings, in which much time may be needed to allow severe stress to relieve itself, the interval at 775 deg. C. may be prolonged for several hours, though always at the cost of superficial decarburising. Such annealing for steel containing less than 0.15 per cent. of carbon should be at 900 deg. C. (1,652 deg. F.). Great brittleness may be caused by annealing very low carbon steel in the neighborhood of 700 deg. C., after cold working.

MASTER PAINTERS' ASSOCIATION

The forty-second annual convention of the Master Car and Locomotive Painters' Association was held in the Hotel Rudolph, Atlantic City, N. J., September 12 to 15, John H. Pitard, Mobile & Ohio, presiding. Mention of the opening session was made in the *Railway Age Gazette* of September 15, page 534. The following are abstracts of the papers read and the subjects discussed:

PRESIDENT'S ADDRESS.

The master painter should not lay himself liable to the mistakes of the manufacturer when using ready mixed paint, the formula of which is unknown to him, and if the paints are to be made by a manufacturer they should be made to a prescribed formula. The master painter of today and of the future should take up the study of chemistry and physics as fundamental principals of one of the branches of the painting business. A practical knowledge of chemistry combined with a practical knowledge of the painting business, will place the painter's art upon a plane where none but the practical painter can dictate its operations.

Accepted theories of long standing regarding the cause and prevention of the rusting or oxidation of steel and iron, and the use of suitable paint materials for their protection, are gradually giving way to new and more plausible theories which attribute this rusting and oxidation to the impurities contained in the metal.

BAKING ENAMELS.

R. Scott (Am. Car & Fdry. Co.): The work must be sterilized before applying the priming coat. The primer should bake at 450 deg F. for a period of 2½ hours. For baking enamel, I would bake at 250 deg. F. for a period of 5 hours. All enamels cannot be baked in the same temperature, in fact much depends on the person doing the work to secure good results.

A. S. Baldwin (Barney & Smith Car Co.): We enamel and bake all of our refrigerators before putting them in place in the car. First, we clean all the iron and galvanized iron with benzine, after which we prime with keg lead ground in oil, thinned to a proper consistency with turpentine, adding ¼ pint of raw linseed oil and ½ pint of gold size japan to two gallons of the mixture. Bake this coating from 140 deg. to 160 deg F., and follow up with three or four coats of flat white, mixed as follows: Pure keg lead ground in oil and thinned to the proper working consistency with turpentine; add ½ pint of gold size japan and bake each coat the same as the first coat. Then apply two coats of enamel mixed as follows: Seven pounds of zinc white, ground in oil, thinned with 1½ pints of turpentine; add ¾ pint of gold size japan. Mix this with one gallon of Flood & Conklin's, or some other good make of white baking copal varnish. This should stand about ten hours before using. Add enough ultra blue in all three mixtures to clear the white. Bake the enamel at from 125 deg. to 140 deg. F. Open the doors of the oven as soon as the greater degree of heat is reached, as the work will turn yellow if allowed to stand with the doors closed. Take from the oven as soon as cool enough to handle. Sandpaper each coat of paint with fine paper for a smooth finish. The second and last coat of enamel can be rubbed to a dull finish or left in the gloss.

C. A. Hubbs (Southern Pacific): We have been doing this work on a small scale, that is, small miscellaneous work and trays for diners. The formula we are using and getting good results from is as follows: To ½ gal. of asphaltum we add ½ pint of boiled oil and ½ pint of gold size japan. To the first coat is added a little lampblack in japan, to give it covering properties. The coats should not be too heavy. The article to be enameled is then placed in the oven and baked for about three hours. Experience will determine the amount of heat necessary. After cooling, the second coat is applied and baked as before. For brass signs, after they are taken from the acid, we fill the design with an enamel called Sapolin, and the sign is allowed to remain in the oven all night with a slow fire. To this enamel we add some japan or asphaltum to aid drying.

John W. Young (Pennsylvania): My experience has been confined to two brands of material—Schrack's black baking japan and clear baking varnish, and Willey's 20th Century elastic gloss red. While the latter material is not a baking enamel, yet we have had excellent results as to its use on fire buckets, which are constructed of galvanized iron. This material has been subjected to very severe tests and has held on to the iron very well. We do not use any priming coats, but simply give the work two coats of red and bake in a temperature of 120 deg. F. for two hours. In regard to black baking japan, we use an under coat which is composed of equal parts of lampblack ground in oil and baking japan, thinned with turpentine. For this work we cannot use any more than 140 deg. F., because of the glass cracking in the lamps, but it would be very much better if we could bake with a temperature of 200 deg. F. I find if lamps are coated and left standing for an hour, and then placed in a cold oven, and heated gradually until the required temperature, 120 deg. F., is reached, we get the best results.

CAUSE OF BLISTERS ON FINISHED CARS.*

J. H. Pitard (Mobile & Ohio): The trouble was due to imperfect drying of the priming coat, or the second coat. The cause of such imperfect drying may have been due to various reasons. The scraping done by the carpenter may have been so slight at the blistered points that the grain of the wood was not thoroughly opened up so as to permit of free absorption of the primer; or it may have been due to one particular painter who applied the priming but failed to spread it uniformly. Lack of uniform spreading of the coatings is a common fault with painters and is in my opinion the cause of many of the deviltries of paint and varnish.

H. Hengeveld (Atl. Coast Line): My opinion as to the cause of the cars blistering in spots is that it is in getting ready for the priming coat. It may have been the fault of the carpenters in not doing their work properly; it may have been that the boards which blistered were applied in repairs and were not properly seasoned; it certainly was the fault of the wood and not of the paint, or the cars would have blistered all over. It may have been caused by the carpenters using oil on their planes, which penetrated the wood. I had a car come in the shop some time ago, which was burned off twelve months previously. This car was badly blistered in spots. I removed the blisters, took a knife and dug a hole in the wood, primed and re-puttied it. I examined this car a few days ago and found it in perfect condition, not a blister anywhere. The fact that the blisters referred to, were down to the wood, is a conclusive proof to me that at those particular spots, there was something in the wood which caused the blistering.

W. H. Truman (N. S.): In this case I have come to the conclusion that the primer was not thoroughly brushed in on the whole surface, and that the second coat was applied too soon, not allowing the primer sufficient time in which to dry. The sun beating against it for two or three hours will certainly produce blisters. It is just possible that the two cars that did not blister were in a little different position from the others, or else the primer was more evenly applied. Had they kept these cars moving back and forth through the yard and not allowed them to stand in one position for two or three hours, or had

*Replies received by the Information Committee on the question: Why does paint blister on parts of cars recently finished, after being burned off and dressed down by carpenters?

they placed them under a shed, until they were placed in service, I am satisfied that there would have been no blisters.

Mr. Scott: I had the same experience last month on a mail car done with the *A-B-C* system. I did not see the car, but received a report on it. It must be the material; maybe it is the body color, but I am of the opinion that it is in the primer, although heat might be the cause. It cannot be on account of water cleaning, as the cars were sand-papered. They might have rushed this car more than the rest. My opinion is that all the trouble comes from the priming.

H. Heffelfinger (Penn.): It is possible that the boards may have been renewed and hurriedly painted while the car was still in service, possibly with only one coat, which did not last, allowing the boards to become saturated with an acid or oil cleaner, which the carpenters did not remove and which would retard the drying of the priming coats. We have been having very successful results with the *A-B-C* system, but do not have our cars dressed down by the carpenters. We simply burn them off, clean, and sand-paper them ourselves. Any new wood is primed with *A* and second coated with *B*. All the old surfaces are primed according to the condition of the old primer. If surfacer *A* had been used, we then prime with a mixture of ½ *A* and ½ *B*. On this coat we putty and then apply surfacer *C*.

METHODS OF RUBBING DOWN.*

Mr. Scott: I am of the opinion that rubbing down with block pumice stone and oil will not prolong the life of a coach and body surfacer. If it were required of me to rub with oil, I would advise rubbing with a block and emery-cloth, which is the easier of the two methods. I have done considerable of it on steel and wood, using ⅔ raw linseed oil and ⅓ benzine. As to the sand-paper method, it depends upon the carpenters to get a smooth job. I have had excellent success doing work this way, especially as to durability, but I think it lots of work to bring a sand-paper job up, and do it correctly. Where the process of rubbing is in force I believe it is wise not to make a change. The sand-paper method is more economical in treating baggage and express cars, and old cars that are burned off, although I believe in applying surfacer to baggage cars as well as coaches, as it pays in the end.

Mr. Truman: In cases where the life of a standard coach and body surfacer means the prevention of rubbing through to the wood, I would say that rubbing down with block pumice stone and oil would prolong the life of a standard coach and body surfacer, because if the wood becomes exposed the oil used in rubbing it would act as a primer to a certain degree, while by the sand-paper method it would be necessary to go over the exposed parts with a primer. However, I do not think either of the foregoing methods is as economical or as satisfactory as the block pumice stone and water, when the surface has been properly treated.

Mr. Keil: I personally abandoned rubbing in oil after a ten years' test, fifteen years ago. I found that the cars rubbed in oil were checked and required burning off sooner than those running in the same train, that were rubbed in water. The sand-paper process is very unsatisfactory from a health standpoint. After finishing twenty new cars with the sand-paper process, about twenty years ago, I had sixteen men sick out of a force of thirty-five men. I would recommend two or three coats of roughstuff, also guide coats of yellow ochre or Venetian red, rubbed in water, as being both economical and durable.

Mr. Hengeveld: We rub our cars with pumice stone and water, and when I state that from six to eight years is the usual time between burning off periods, in our hot climate, I do not think we have much to complain of in the way of prolonging the life of our body surfaces. In reference to the dry sand-paper method, will say that some years ago we adopted this method for second class cars. After about four years, I came to the conclusion that there was nothing in it to recommend. It cracked a great deal sooner than a properly rubbed surface. It presented an unsatisfactory appearance, and taken as a whole, it was expensive in the end. We therefore discarded this method and returned to pumice stone and water.

*Replies received by the Information Committee to the questions: Will the rubbing down with block pumice stone and oil prolong the life of a standard coach body surfacer? If the surface or finish obtained by the dry sand-paper method is acceptable, considering economy, which of the above methods is advisable?

STEEL WOOL.*

Mr. Scott: I have used considerable steel wool and have found it to work very satisfactorily on inside work, where the varnish has had ample time to dry. It is fine for moldings, but I found it injurious to the hands of the workmen, who condemned it on account of the fine particles running into their hands. If the varnish is hard it never sticks, only where there are fatty wedges. I have often used it on finishing the outside, and it works very nicely. Personally, give me good sand-paper and I will get the best job, although the labor in using sand-paper is more expensive, excepting say on sash, where there is a saving.

Mr. Hengeveld: My experience with steel wool is such as to convince me that it is superior in every way to sand-paper or emery-cloth. I am satisfied that if properly used it is more economical. I have never had a case where it injured anyone's hands. If undercoats are given plenty of time to dry there is no trouble about its sticking to varnished surfaces. I have used this material for years and it has given general satisfaction.

Mr. Truman: I am opposed to steel wool.

J. G. Keil (L. S. & M. S.): I discarded the use of steel wool about 18 years ago. I found that it would make the men's hands very sore, by the small particles getting into the flesh and afterwards festering. The workmen got so that they would use gloves, which causes very inferior work on the interior of coaches. A good grade of garnet paper, in my opinion, is cheaper and you can turn out a better quality of work at less cost. The only practical place it can be used to advantage, is on furniture work.

REPEATING COATS OF VARNISH.†

Mr. Truman: It has been my custom the past twelve years to use this process; however, for a first-class job, I would not recommend it. I am free to recommend it for desirability, but not for appearance.

Mr. Hengeveld: Some years ago I experimented along this line, that is, I followed the coats daily and I came to the conclusion that it was not a practical way to do the work; it did not have that brilliant appearance which is obtained when coats are allowed to harden before others are applied. I now allow two days between coats.

Mr. Keil: The practice of repeating coats of varnish on passenger equipment, in my opinion, is not practical and does not make a first-class job. When done, it is always at the expense of durability and brilliancy of the luster of the varnish.

Mr. Scott: My opinion is that generally 48 hours between coats will always bring about more durable results, than the 24-hour method.

Mr. Heffelfinger: The better way is to let each coat dry at least 48 hours before applying another coat. This has been my experience, yet I have varnished cars each day where the

*Replies received by the Information Committee to the questions: What is your experience with steel wool in place of sand-paper or emery-cloth? Which is the more economical system? Is steel wool injurious to the hands? Will it stick to the varnished surfaces after rubbing, previous to varnishing?

†Replies received by Information Committee on the questions: Is this a practical way to secure a first-class job? Are other roads using it on their best equipment?

varnish had a good luster and wore well, but it came about by allowing as much time between coats as possible, and on cars receiving two coats, such as cars cut in, and baggage cars repainted over the old surface. On all new or first-class repairs, I let each coat of varnish stand at least one day for drying, which is little enough in my opinion, to guarantee a durable job.

APPEARANCE AND DURABILITY OF THE INTERIOR FINISH OF STEEL PASSENGER EQUIPMENT.

John Gearhardt (Penn.): It is essential that a smooth surface be provided before starting in with the color desired, yet we do not advocate applying more glazing or surfacer than is absolutely necessary. The following method employed by us is the one we consider the best: The steel is sand blasted and the interior of the car is immediately primed with a good metal primer; if the steel is allowed to remain without priming for but a short time, corrosion results, which greatly affects the durability of the finish. Necessary puttying, glazing and surfacing is then done; a smooth surface is next produced by rubbing with emery-cloth, using linseed oil and benzine; the day following the rubbing the ground color desired is applied; after this the striping or decorating is done and three coats of rubbing varnish applied; we then rub to nearly a flat finish with pulverized pumice stone, oil or renovator. Our reason for advocating rubbing to almost a flat finish is on account of the unevenness of the steel and the buckles which get into it in assembling the car.

In our opinion the two most important operations in the finishing of either the interior or exterior of steel cars considering durability is, first, to have the steel free from rust, for if rust is allowed to remain on the steel before priming, it matters not what kind or how good a priming material is used, rust will continue. Second: To rub both the surfacer and varnish with oil instead of water. After twelve years' experience of rubbing with oil, I have concluded that the practice of using water in rubbing of either wooden or steel cars should be considered an obsolete practice.

Pullman Car Company: The steel, in whatever form it is, is covered with rust and scale, which must all be removed before painting. There are at present three methods in use to remove the scale, etc.: First, acid pickling, which can be done either by pickling by sulphuric acid (oil of vitriol), or by hydrochloric acid (muriatic acid). Second, sand blasting. Third, rotating grinders, emery wheels or hand emerying.

The first method or acid pickling is the one which, from the painter's standpoint, needs the greatest care and consideration. The acid not only loosens the rust and scale, but it also dissolves the steel, but not altogether evenly over the surface. The steel plate is a mass of small crystals, of varying size, hardness and chemical composition. The acid attacks some of these crystals much faster than others, and it also creeps or follows along the outlines of the crystals, going into all the minute inter-crystalar crevices, etc. Once having lodged in these crevices, the acid tends to remain there, being held rather strongly by capillary attraction and it is removed with considerable difficulty. The surest way to wash the acid out is with a spray or stream of hot water which is under some pressure. The force drives the water into the crevices and it dilutes and washes out the acid. Some force is almost necessary in order to overcome the capillary attraction and fresh water should be used to insure no acid remaining on the plate. Some do not use the running water, but neutralize the last traces of acid with lime water.

When sulphuric acid is used as the pickling agent, unless it is completely washed away, there is always great danger for the future life of the paint on such plates. Sulphuric acid is a non-volatile acid at ordinary temperatures, absorbing moisture with great avidity, and when heated does not volatilize at from below 350 deg. F. to 450 deg. F. When painting over a plate having traces of sulphuric acid on it, the baking temperatures are not high enough to get rid of the acid, and the temperatures used (about 200 deg. F.) make the acid, even in minute quantities, very active. Its effects may not be noticeable to the eye at the time, but the chemical action continues to develop, affecting both the steel and the paint, and after a time we have a "running sore" rust spot which may be deep or may spread out under the painted surface.

Hydrochloric acid, as a pickling agent, also attacks the steel in much the same way that the sulphuric acid does, but the capillary attraction is not as strong as the sulphuric acid. It also readily volatilizes at low temperatures and consequently when a plate has been pickled in hydrochloric acid and has been washed off but a trace of acid remains. It does not have a strong attraction for water like sulphuric acid, which absorbs water readily and so spreads itself over the sheet. Hydrochloric acid, though safer than sulphuric, should be washed away with great thoroughness and care, as once it starts a rust spot, the rust itself will create more and more rust.

The safest and best method for cleaning steel is to use the sand blast. When properly adjusted and regulated thin plates can be cleaned without being damaged or buckled. Care should be used to see that the plates do not become cooler than the work shop temperature, as there would be a condensation of moisture from the air which would cause corrosion, even after painting. The grinding or emerying process is slow, and it is difficult to polish evenly over a large surface. The tendency is also to burn the plates and to buckle them.

After the steel has been thoroughly freed from scale, rust, etc., and there is freedom from all traces of acid, it is ready for the painter. The best method of painting the interior of a car, according to our present experience, is to prime the steel and bake it at a temperature of approximately 200 deg. F. There is one general fault with this procedure which may show itself later in the renewal of the interior finish; that is the baked primer is removed with great difficulty, the only methods for removing it, at the present time, are emerying or sand blasting. Where plates are to be riveted and hot rivets are used, the heads, on cooling, should be polished and then painted at once. All rivets, hot or cold, should be drawn tight and close. The reason for painting at once after setting, is that the moisture causes an electro-chemical reaction between the rusted or scale covered rivet and the steel plate, the result being that the plate around the rivet rusts and corrodes with great rapidity.

The primer used should be one which is an inhibiter of rust or corrosion, and especially so when applied to the rivets. It is the usual procedure on most riveted surfaces to use litharge or red lead paints, but tests show that a great many of these paints are direct stimulators of corrosion, no doubt due to impurities which the red lead or litharge contain. The reaction between the rivets and plate is prohibited by the inhibiting primer and subsequent coats of paint and moisture resisting varnishes. The usual processes of puttying, knifing in, sanding, etc., are followed. Dry sanding is to be recommended, the men being compelled to wear nose breathers to keep out the paint dust. Care must be taken to see that surface to be painted is at least as warm as the outside temperature and preferably a little warmer. This insures no moisture from the atmosphere condensing on the surface of the car. Where wet rubbing is used, the surface should be well dried and the car kept in a warm room to make sure that all the moisture is driven out of the paint films, cracks, corners, etc.

Several coats of color may now be applied and the interior is ready for graining or other finish. A good water and moisture resisting varnish, such as well made Kauri gum varnish should then be applied. We now have a finished paint on a steel surface free from all scale, rust, acid and moisture with a most inhibiting primary coat, baked on, smoothed, grained and varnished with a moisture resisting varnish. This is about as much as the painter can do for the preservation of the interior of a steel car.

With regard to the care and up-keep of the finished car: It is impossible to burn off the paint finish of a steel car and not do great damage, and the use of a varnish and paint remover will take you through only to the baked primer. As yet I have not found a varnish remover which will dissolve or loosen a baked primer in a reasonable time and at the same time not injure the steel or other parts. The only methods at present applicable are either sand blasting or emerying, the necessary care being taken not to burn, buckle or bend the steel. This is the worst feature of baking the paint and it may be of sufficient difficulty to ceuse a change in our methods. Where only a refinishing is necessary, a varnish remover will take you back to the primer, leaving you with a baked plate to build up on.

For surface cleaning, soaps of all kinds are to be avoided, as even the mildest has its effect both on the gloss and on the life of the varnish finish. An oil cleaner with a small percentage of a fine rouge or other gritful substance, will remove any dirt and at the same time revive the varnish and fill any hair checks with a water resisting film. The oil must be such that it will not injure the varnish and it must be free from all dirt and leave a dry, clean, greaseless, non-dust collecting surface.

F. W. Brazier (N. Y. C. & H. R.): I look upon these meetings as experience meetings. We should cite our own experience and the trouble we have had with our steel cars. We have had steel cars now for about four years, and Mr. Butts can tell you what the trouble has been with them. Some of the products used on them by the Pullman Company oozed out and spoiled the paint, and he has had to fix it up. I think you should be sure to tell what your troubles have been. Here is the place to let the others know what you know.

H. M. Butts (N. Y. C. & H. R.): There is any amount of trouble in maintaining the paint on a steel passenger car, and our troubles have only begun, in my estimation. I think we are destined in the future to condemn the steel car as a success, from the painter's standpoint. They are in their experimental stage at present, but I doubt very much whether they will be voted a success from the standpoint of economy, or from the standpoint of danger, or from any other standpoint. The trouble Mr. Brazer speaks of, with the new cars coming out of the factory, was that back of the letter board, there had been used a fibrous substance that was fastened to the back side of the letter board, a steel sheet, for insulating purposes, I believe. It was glued on with a preparation made of sal soda mixture, and when the heat of the sun struck the letter board, it softened, and oozed out through the joints, and dissolved the paint instantly, wherever it touched it. It ran down the panels, between the windows, over the window sills, and to the sheathing, cutting the paint through to the steel, and it was rusted before the car was out of the shop. The greatest trouble we are having is around the rivet heads, and wherever two pieces of metal are joined together and lapped. It is only a matter of a few months before there is an opening there sufficient to take in moisture, and corrosion begins at once. What the end will be is only imaginary, but on all parts of the car, especially around the vestibules, where the upright surfaces come down and lap on, and are bolted to the platform structures, there is apt to be trouble. The steel cars that have been in local service for six years have to go into the shop every few months and the steel has to be renewed where it is rusted. After the corrosion once begins, I have never found any coating that would stop it. It is only a few months before it shows itself again. I do not care how bright you clean it; the corrosion goes on constantly, and will get to be so severe that they will have to get a metal that will not corrode, or use something that will stop corrosion, which has not been found as yet to my knowledge. We have a number of baggage and mail cars with steel roofs. They are painted with one of the best metal primers I know anything about, but such was the action of the cinders that the paint was cut away in a short time, and corrosion began. Nearly all of our roofs become bare in nine months, and get badly corroded.

John Gearhart (Penn.): Last season we had cars out 32 months, and nothing was done to them at all; some were out 40 months; I have seen the roofs and they are nothing like those Mr. Butts tells about. But I believe those cars should have their roofs coated after running six or eight months. Give them another coat, so as to have a body on before the cinders get a chance to wear the paint off. We give the roofs three coats of paint; we prime them before the sand blast, and then put two coats on. We use a primer, the same as for the other cars, and then use a metallic primer, just exactly as for our freight car color. In our dining cars we shall have to get a non-rusting metal for parts of them, and for some places in the vestibule, because they rust so. But on the balance of our cars that we have had out for six years I do not see anything alarming at all. We had some trouble in some of our work with that silicate soda glue. It is a glue that was used to put the insulating material on. Now we have changed and are using a coat of our freight car paint, and are sticking it on with that. We just make the freight car paint a little heavier, and use an asbestos material with it, and it sticks as well as on the silicate of soda. We have the benefit of an extra coat of paint on the interior sheet, and we feel certain that that coat will protect it as well as a coat of paint. On some of the large sheets we may have to clamp it until it dries.

E. F. Bigelow (M. C.): I think as a matter of durability, if we can get the priming to stick on the iron, there is no question but that the surface can be prepared, the same as on wood. With a proper surfacing, and water eliminated entirely from the interior during the process of surfacing and painting, there is no reason, with the primer adhering sufficiently to the steel, why durability cannot be produced.

Mr. Butts: It has been a common practice for years to rub the filled surfaces and rough stuff on the inside of the car with pumice stone and water. I believe it is a mistake to use water for rubbing the filled coat on a steel surface, that it could be rubbed with a mixture of linseed oil and benzine, to avoid any possibility of water getting into crevices and starting corrosion.

Mr. Gearhart: We have been rubbing with oil and benzine for twelve years, using emery with a block beneath it; we had orders some time ago to do five dining cars with a special surfacer, and they asked us to use sandpaper and water instead of the oil. The next morning after we rubbed that car, every place we rubbed through, and it is almost impossible to keep the sand from rubbing through, was rusted all over. The balance of the cars were rubbed with oil and benzine, and I know they will last as long as the ones rubbed with water. When we changed from water to oil, we cut down our piece work price by about one-fourth. You can get as good a surface with the emery and oil as with pumice stone, but you will have to pay as much or more; however, we do not get as good a surface, and our people thought we were getting too good a surface when using the other. But on the outside and inside of passenger cars, we get a smooth enough surface to answer our purposes. I admit you can go quicker with sandpaper and water than with oil.

Mr. Pitard: What kind of oil do you use?

Mr. Gearheart: Linseed oil. But we found we could rub it quicker and better, and it would evaporate much quicker by using benzine with it.

W. Q. Quest (P. & L. E.): That would be 54 deg. Baume petroleum. Do you have any delays before your rough stuff would be hard enough to stand? Do you wait from one day to the next day, or do you go on with your benzine and oil, the same as you would go on with the work while using water? Could you follow it with benzine, and not have a softening effect?

Mr. Gearheart: We would, if you leave it on long enough.

Mr. Quest: That would be a matter of rapid handling. You would have to get it on and off quick, so that it would not become soluble under the benzine.

H. Heffelfinger (Penn.): If you apply it to the rough stuff each day, and rub with half oil and half benzine, it won't soften up. I think the rubbing with oil and benzine is the ideal way to do steel coaches, and a very much better way than with sand-paper and water.

Mr. Gearheart: Nobody can rub the outside of a car with water without having a lot of it splash on the inside, where it is not protected, and it will go in places on your steel floors, where you cannot get at it afterwards. With oil, it is different; if it does get inside, it will not hurt anything. I believe it is the only safe way of handling a new steel car.

Mr. Bigelow: I would like to ask Mr. Gearheart whether the rubbing with oil has any tendency to crack the subsequent coats of paint. I have noticed some steel cars that were badly crecked inside. I do not know whether the surfacer soaks up the oil to that extent, so that it cannot harden sufficiently to apply a coat of paint in the time usually taken, that is, waiting until the next day.

T. J. Hutchinson (G. T.): Another point is the question of whether rough stuff absorbs sufficient oil to warrant the use of oil in rubbing your exterior finishing. It is claimed by some that the oil used in the rubbing adds life to the surfacer. For my part, I never could see that there was anything to that at all. I should like to have an expression on that point.

Mr. Gearheart: I have seen many cars on the different roads of the country, and I do not think the records show that our cars are cracking more than those of any one else. I never believed that it hurt the surfacer at all; in fact, I believe in the theory that the oil the surfacer takes up would add to the life of that surfacer. About wiping the oil off, there is not any oil to wipe off. We rub until the men think they have a smooth surface, and then they wipe it and finish with fine emery. When they have what they think is a surface with their coarser paper, they do not put any more oil on; what oil is there is what is absorbed by the surfacer.

CHEMICAL AND PRACTICAL TESTING OF PAINT SHOP MATERIALS.

J. H. Gibboney, chief chemist of the Norfolk & Western, presented a paper on this subject as follows:

The constants that we have found to be of greatest value in determining the quality of linseed oil are specific gravity, which we think should be from .932 to .936 at 60 deg. F.; if lower it indicates the possibility of the presence of some percentage of a semi-drying. The most valuable test that we have found in such cases is one determining the rate and degree of oxidation under normal exposure, and in making this test we employ five small thin aluminum plates, 3 in. x 6 in., all fitting into a wire rack. One gram of oil is spread on these plates and allowed to dry; if we find the rate of oxygen absorption reasonably uniform, and reaching a maximum of approximately 16 per cent. in about 80 hours, we feel reasonably assured that such oil, when used with ordinary strength driers, will give a proper and satisfactory drying.

The paste paints specifications state that the material will be purchased by the pound, that it must contain nothing but pure raw linseed oil, conforming to the company's established standard for this material, and pigment, in well defined proportions by weight, and that the pigment if a single one, must have a composition recognized as a proper one by the trade, and if a composite one, must be made up by compounding two or more pigments in certain percentages by weight. Some further features are given prominence, that is, that the shade must conform to the established standard, a sample of which is furnished prospective shippers, and that the grinding must be of such degree as to give a finished paste that will not feel gritty or separate on thinning. A simple fineness test is outlined in each specification which we have always found to be reasonable and which has also met with favor from the manufacturers. In a few cases we have found it necessary to go still further and state specific qualities desired in some single pigments making up a composite, placing limitations on impurities considered as undesirable. To obtain satisfactory results in purchasing under this plan the restrictions should be as few in number as is consistent with obtaining the material desired.

As it is assumed under the terms of the contract that a shipment is to be of uniform quality, a sample drawn from a single barrel, selected at random, should be considered as representative of the lot. The barrel selected should be opened by removing the head and should be thoroughly stirred by means of a heavy paddle to obtain a fair sample. We have always made it a practice to outline our methods of examination, in detail, to the manufacturers desiring such information, and it is a pleasure to record the very few controversies that we have experienced in this feature of our work.

Our method is to weigh accurately into a tared glass tube, the dimensions of which approximate 1½ in. diameter by 5½ in. long, and the weight about 75 grams, approximately 10 grams of paste. To this is added about 50 cubic centimeters of sulphuric ether, and the solution of the major portion of the oil is effected by stirring with a stiff platinum wire. The tube is then set into one arm of the common type of centrifuge used for milk examinations, and into the opposite arm a tube with sufficient water to counterbalance. By revolving the tubes at a rate of approximately 100 r. p. m. separation of the pigment from the solution of oil in ether is readily obtained in a few minutes. This oil extract is then poured off into a small beaker and the ether is expelled by placing it in hot water, the last traces being driven off by the heat of a hot plate of several minutes duration. The pigment in the bottom of the tube is then further treated with 88 deg. Baume. gasoline and two such extractions, with one further extraction with a small quantity of ether, will remove all but the slightest trace of the oil. The tube and pigment is now dried and weighed, and from the loss in weight found the proportions of oil and pigment are calculated. We have always found that all pigments have some action, slight in most cases, on the linseed oil present in the paste, and it is our practice to make a proper allowance for this condition, especially so in the case of paste containing a lead base.

Commercial spirits turpentine of the trade, obtained by the distillation of gum resin, is water white in color, with a specific gravity at 60 deg. F., ranging from .862 to .870, a boiling point between 300 deg. F. and 320 deg. F., a flashing point ranging from 100 deg. F to 106 deg. F., and it has a content of about 10 per cent. that is insoluble in sulphuric acid. Upon evaporation on glass a good quality of turpentine will leave only a slight trace of a resin like residue, which can be expressed by a small fraction of 1 per cent. This slight residue, when taken in conjunction with the property of pinene, the chief constituent of turpentine, will absorb oxygen and impart it to the oil of a paint film, which is responsible for the drying effects similar, but in less degree, to the stronger lead and manganese driers, and accounts for the drying conditions which we have been unable to obtain from the so-called substitutes.

In the cases of varnish testing it is imperative to have the exposure over the company's standard shade of body color, since it is common knowledge that the same varnish will ofttimes give different results when applied over the different colors. We have received during the past two years a great number of protective paints, representing some twenty-five or thirty distinct suggestions for metal protection, including the carbon blacks, graphites, iron oxides, in various compositions with different inerts, composite pigments containing small amounts of various chromates, coal tar products, special vehicle

combinations, and others too numerous to mention, all of which are now having their day in court. Our system of testing these materials consists of complete chemical examination in detail, the regular panel exposure, and the exposure of from five to twenty-five cars under actual service conditions. In preparing a car for a service test, one-half of the two sides and one end are painted just as is prescribed by the manufacturer and the opposite half of the car is finished with our standard method of treatment, each half being properly stencilled for identification, with date of application, and the further instruction that the car must not be repainted except at our Roanoke shops. The panel test, which consists in painting one-half of a steel panel with the test paint and the other half with the standard treatment, is prepared and exposed at the time of painting the cars, and is used to indicate the progress of the exposure on the cars, so that when so indicated by the panel an inspection of the cars can be made.

We do not hesitate to go on record, that as the outcome of some fifteen years' experience with the testing of steel protective coatings from a practical standpoint, we are still of the opinion that properly and freshly prepared red lead in raw linseed oil of proper consistency and when properly applied as priming coat, and for second and third coats, a high oil carrying elastic paint, containing as pigment a composite, composed of 50 per cent. lampblack, 45 per cent. inert silicious material and 5 per cent. red lead, ground in linseed oil and thinned to a proper working consistency with boiled linseed oil and japan oil, has given a service which has not to this time been equalled. However, as the result of our present tests, which include some 500 cars in actual service, our present position will either be reinforced, or we will have intelligent information to form a basis for a change.

ECONOMY IN RAILWAY PAINTING.

D. A. Little (Penn.): There are two kinds of economy, false and true, and I think that we have drifted from the true to the false and in my opinion no one is more to blame for it than our individual selves. We are losing sight of the durability, and that we are to blame is evidenced from an article in the *Painters' Magazine* on Scientific Painting, by Charles E. Copp, who commented on an article by Carl F. Woods, an engineering chemist of Boston, wherein he said: "It has been shown by actual results that a saving of from $20 to $30 can be made on the painting of each car and an increase in life obtained of from five to ten years by the adoption of scientific methods of finishing."

Why should we not have a good (not a carriage-body) finish and the utmost degree of durability possible? There is no economy in any other method of painting, and we, as master painters, are greatly, if not altogether, to blame for the departure from this standard. It may be due to the insistence of our superiors to go further into the matter than we know was consistent, but why did we do it? Had we the courage of our convictions we would have shown our superiors the fallacy of such procedure. From the nature of conditions they could not have known what we did—or should know—about painting, and had we done so, our railway equipment would be a credit to us today. There are too many cars and engines turned out of paint shops at the present time that look as if they were painted by laborers instead of painters.

Many freak ideas have been advanced in the interest of economy. I have recollections of a very recent occurrence where a superior officer required his forman painter to use only a coat of flat black on his driving wheels and lower parts and no varnish whatever. In another case which I have in mind a master mechanic some years ago told how he was practicing economy in his paint shop by omitting the removal of flash and scale before priming his tanks, which we, as practical painters, know is entirely wrong and wasting good materials, and in our acquiescence in such methods there is no economy, no sense in it, if any engine or car is worth painting it is worth painting right. Better be guided by the old maxim:

"Whatever you do, do with your might,
Things done by halves are never done right."

The equipment of any railway is an index of its prosperity and good management, just as a clean, well kept home indicates the good housewife. If the railway has ramshackle dirty cars and engines, and the shops are in bad condition, the employees soon drift into a similar condition and don't take any interest in the company's welfare, while, on the contrary, a clean, well-kept equipment and orderly shop imbues the employee with a spirit of thrift and industry, and nothing contributes so much to the latter condition as good, practical, common-sense painting. Nothing is cheaper today in railway practice than practical painting; it won't average 5 per cent. of the cost. and maintenance, yet it is often considered of little moment. We, as master painters, are asleep on the job, it is time to wake up! Let us reason with our superiors in this matter of economy, showing them the true, as opposed to false, economy and in nine cases out of ten they will defer to our judgment if we are right and prove it to them. Our equipment will look better, last longer and cost less, and to us will be given due credit.

Mr. Butts: I would ask that the articles referred to in Mr. Little's remarks be incorporated in the proceedings of this convention.

T. R. Cowan (C. P.): I suggest that the secretary request the *Railway Age Gazette* to print these articles so that they may be read by the railway officers.

In accordance with this request the two papers are abstracted below. Carl F. Woods in a paper before the American Chemical Society said:

It is probable that no one of the methods used in railway painting embodies the maximum efficiency possible, and in view of the very large amount of money involved, it is desirable that the entire subject be given careful study by technical chemists. The cost of painting the same type of car varies on different roads from $30 to $60, or even more. Some roads are forced to repaint their cars every two years while other roads by means of an annual coat of varnish, make one painting wear from ten to fifteen years. The color and varnish process is of very recent origin and is a radical departure from the older lead oil and surfacer systems. The fundamental idea of the new process is that the fewer the number of coats and the more similar these coats are in composition, the more durable will be the final results obtained. With this in view, a combination of coats is applied which are so composed as to prime the wood, prepare a surface, and obtain the desired color at the same time. This is accomplished by employing heavy silicate paints, containing the proper color ground in the same kind of varnish, each coat possessing suitable drying qualities for its respective demands. The best results are obtained by the use of dark colors, such as green or brown, because the principal ingredient may be ocher, umber or some other natural earth pigment which not only produces the desired shade, but is well adapted for preparing a foundation. The surface so obtained is covered with a coat of the body color ground in varnish, followed by one thick coat of finishing varnish.

Each of the processes referred to has its specific faults and virtues. The "lead and oil" process, if properly applied, requires from three to four weeks and the application of ten or more coats. The "surfacer" process requires about the same number of coats, but, owing to the quick drying of the surfacers, requires but two or three weeks for application. The "color and varnish" process is the simplest of all, and has been applied with apparently successful results in from six to eight days, with an application of four to six coats. It should be understood that the aim of this shorter process is durability at the lowest cost, and that appearance is in a measure sacrificed. On the other hand the process is dependent upon specially made

paints in which adulteration is difficult of detection, and which if carelessly made, are not only short lived, but render more difficult the refinishing of the car. It has been shown by actual results that a saving of $20 to $30 can be made on the painting of each car and an increase in life obtained of from five to ten years by the adoption of scientific methods of finishing.

Mr. Copp's reply to this article was then read as published in the *Painters' Magazine* and is abstracted as follows:

Years ago the cost of painting a first-class passenger coach was estimated at about $600, and about three months was required to do it. Today we divide both the time and the cost very nearly by six. It would seem that the economy in car painting is already down to about the lowest notch consistent with a passable finish and a fair degree of durability, but when this chemist tells of the system to be used in the place of the lead and oil and a surfacer system for finishing cars, he is talking of the most expensive materials that can be used for this purpose, as are all varnish color productions. Besides, with this system the labor to produce the requisite surface is more expensive. He says "the lead and oil process, if properly applied, requires from three to four weeks and the application of ten or more coats." At the present time railway shops cut this time and the number of coats for this work about in half.

The surfacer systems require only five coats (and three of those are of "rough stuff") to the color, and two coats of color and two coats of varnish, or nine coats in all. And they have systems of doing this all in about six days! But there is a knifing system of three coats to the color that can be safely done in four days. He says his varnish-color method of four to six coats can be done in six to eight days.

This writer concedes and advises, for some classes of cars running on passenger trains, an enamel and oil combination finish in place of varnish, the priming surfacing having been brought up with lead and oil predominating in suitable pigments. These cars can safely run four years without shopping at all. His statement that "some roads are forced to paint their cars every two years," is questioned. They may cut them in with a thin coat of color before varnishing as often as that, but a painted car means one so badly cracked that burning off or resurfacing is necessary. He also says that annual varnishing makes a painted car last from ten to fifteen years. Then by all means keep up the annual varnishing as the best piece of economy imaginable.

Mr. Butts: We recently have revised our specifications for painting locomotives, and in doing so we have retained those parts of the locomotive that need to be done in a way to enhance the good looks and maintain the equipment in a respectable way. For instance, the cabs and upper works and tanks, are being painted as well as they were, but on the frames, trucks, fireboxes, pilots, and other parts of the locomotive that get covered with grease the first trip out, one coat of paint is as good as any number of coats. In this way, we have reduced the cost of painting our locomotives nearly one-half.

Mr. Watts: There has been much progress made by paint manufacturers in the line of economy and durability, also the reverse; but unless we can convince our superior officers that in supplying these cheap materials there is no true economy we cannot accomplish very much good.

Mr. Martin: What method do you employ on your driving wheels—one coat?

Mr. Copp: No; we give them two.

Mr. Butts: We have a separate specification for freight engines and passenger engines. When we go down to the iron, we prime it with a first class metallic primer, and follow it with what we call the intermediate coat, and then knife it in or sandpaper it to get a good surface. When they return to the shop, we use our judgment. Sometimes one coat will do, and sometimes not, depending on the condition. We do all the exposed parts of our engine in the same way, the driving wheels, cab, sandbox, upper works and body of the tank and cylinders. New work, we give the trucks two coats; when they come in for repairs, we give them one. We clean them thoroughly before we paint them at all.

Mr. Cook: The papers presented have so clearly enunciated the principles of this association in regard to railway painting, that I feel we can put ourselves on record with reference to that subject. Therefore, I move that it is the sense of this association that real economy and the limit of economy is reached by the practical painting of railway equipment. (The motion was carried.)

REMOVING VARNISH FROM CAR INTERIORS.

A. H. Phillips (N. Y. O. & W.): After inspecting the interior of the car when shopped for general painting, we often find the window caps, door casings and jams, also some parts around the lavatories, badly bruised and mutilated, and in order that the painter may make a satisfactory job of refinishing, the cabinet maker needs to scrape them. The cabinet maker makes use of the varnish remover, to remove the old varnish, so that he may be able to do the scraping more quickly. If the painter removed the varnish and the cabinet maker followed with the scraper it would necessitate two men on the job with two different prices. When about all the old varnish needs to be removed, we assign the entire job to the painter, after which the cabinet makers scrape or replace with new, all parts necessary.

Mr. Butts: In our shop, the inspector goes through the car—he is the foreman in charge of the interior work—and marks up all the places to be removed. The painters do the removing; the carpenters do the smoothing and finishing necessary to be done, if any. We think the painters, having the tools and the training, can do it better than the carpenters.

Mr. Quest: Our practice is about the same, except that if the abrasions are not too bad, the painters bleach them with oxalic acid. The seat arms, as a rule, are scraped; but generally we remove the varnish, and have the scraping done afterwards. There are many times, in a light colored car, when time can be saved by bleaching out the spots and touching them up.

Mr. Miller: You do not require regular painters to do the cleaning, do you?

Mr. Quest: No. We do that with a cheaper grade of labor. We have no piece price for it, but do it with a cheaper gang of men.

Mr. Hutchinson: On all fittings removed from the car, we supply the cabinet maker with the remover, and expect him to complete the work.

W. J. Russell (G. T.): My experience is that the cheaper class of workmen is the more expensive. I believe the ones to do the finishing are the ones to do the removing. I have removed the varnish on several cars, and never touched the filling, never got below the shellac, and made a fine job, but I had to do it with mechanics. A laborer, when he gets down to the wood, take off the filling.

Mr. Hutchinson: I select what you might call in all shops the handy man, the intelligent man, who takes an interest in his work, and who in a short time is particularly interested in that operation. In a short time he becomes efficient at it.

A. J. Bush (D. & H.): Our practice is the same as that of Mr. Russell. The inside finishers do that work, and we never allow the cabinet makers to have varnish remover except by special permission. On window caps, where it is hard, we sometimes give them some; but I think the work should generally be done by the men who understand it.

W. Bailey (B. & M.): I favor the painters doing this work. I believe the men who put it on should take it off. It is a disagreeable job, but I believe it belongs to the painters.

Mr. Cook: I believe that the work assigned to the cabinet makers should be to repair all defects and to remove all stains that cannot be removed by varnish remover. I will move that we go on record to that effect. (The motion was carried.)

HEADLININGS OF PASSENGER CARS.

James Gratton (B. R. & P.): I have looked into the various makes of headlining material in our cars, and, in my opinion, composite board is the most suitable headlining material from the painters' standpoint, as heat and moisture do not affect it the same as wood veneer and other headlining materials. The composite board is an excellent non-conductor, it is impervious to sound, will keep out heat and cold and is not distorted by shocks and strains, it will not check, crack or blister, as is the case with veneer headlining when exposed to moisture and to extremes of temperature.

When putting in new headlinings prime the front and the back of the sheets before applying. After the headlining is in place, putty all the defects and give it two leveling coats of surfacer, and rub with No. 1½ sandpaper and apply two coats of flat color to harmonize with the interior finish of the car, decorate in gold (we use one 3/8-in. gold stripe) and apply two coats of pale body varnish. When thoroughly hard, rub down to an egg shell finish or leave in the gloss as may be desired.

To maintain headlinings finished in the natural wood, we clean and refinish in the natural wood finish as long as they present a fair appearance. After they become discolored from length of service, repeated varnishing, burning around lamps, or from a defective roof or where the veneering comes apart requiring removal and replacing with new sheets, or where they have been elaborately decorated with scrolls and stripes (which in the present age is a thing of the past) and which to patch and redecorate would be unsatisfactory and expensive, we consider it best to thoroughly sandpaper, apply one coat of filler and two coats of flat color to harmonize with the interior finish of the car, and two coats of pale body varnish. When thoroughly hard, rub down to an egg shell finish or leave in the gloss, as desired. At such times as the car needs shopping again we find that a headlining finished in this way will clean up very nicely and will not need any further expense added to it other than cleaning and revarnishing or going over with a good emulsion car cleaner.

T. R. Cowan (C. P.): The ceilings or headlinings, known as the Empire style, consist of veneer of several layers cut and pressed into the required shapes and forms. They are given a good coat of paint before being placed in position; this protects the back from dampness. After the veneer is fitted the screw holes and joints are primed and puttied with hard putty; they are allowed to stand for twenty-four hours and then sandpapered down. A good coat of glue size is then applied to the veneers, using fish glue reduced to a proper working consistency, and allowed to dry before canvas is applied. Duck canvas of a very strong quality is then cut to the required shapes to fit, and given a good heavy coating of size which is an equal preparation of glue and flour made into a very strong adhesive cement. This should stand a short time after sizing to allow for any shrinkage that may take place.

The canvas is then placed in position, being well rolled and rubbed out to remove air blisters and creases. It should be allowed to set for at least twenty-four hours to properly dry. The canvas then receives a good coat of glue size, care being taken to avoid missing any portion of the canvas, as any unsized parts will make the painting look patchy. When dried, the canvas is ready to receive its first coat of paint, a good strong color being well brushed into the canvas. The next operation is that of glazing. All seams are glazed evenly so that the joints of the canvas will not be noticeable. When properly dry it is given a good sandpapering to even down any heavy glazing or putty spots. The second, third and fourth coats are given, using a tint suitable for the gilding grounds of Dutch metal or aluminum leaf—such colors as yellow and silver grey.

The ceiling is now ready for the gilder, who prepares a strong gilding size and goes over the whole surface evenly. The lacquer can be used of any shade and according to the style of ornamental work to be applied. Stencils can be cut for any design and the colors used in stencilling should not be too dark. I think a color similar to the lacquered work (a few shades darker) produces a good effect; much better than dark lines. Three coats of rubbing varnish are applied to the work, allowing the usual time of drying between coats. These headlinings as a rule are only varnished every five or six years. We do not rub them because the projections on the canvas would only rub through.

Agasote Headlining.—Our method of preparing these headlinings is to first of all give to the back a good coat of strong brown paint, missing no part of it. These sheets are then ready for painting, but in cases where rough surfaces might occasionally be received, the following method might be employed. The inner side of the sheet is rubbed down till smooth, using coarse sandpaper. Use a block slightly smaller than a full sheet of sandpaper to allow for tacking down. This block is well weighted on top, a long handle is inserted in the block, and the block is moved all over the surface of the board, which in a very short time will take on a very smooth face.

The board is then ready for the carpenters to nail up in position. After the lining is fitted it is given a good strong priming coat, and when dry all the holes are puttied up and glazed where necessary, and left to dry for about twenty-four hours. Before receiving the second coat it is again well sandpapered, and it is also sandpapered before the final coats. The second and third coats are of the standard colors, the principal of which is green and very pale. These coats do not want to dry bright, but a little on the flat side, which makes the stencilling work much better, and gives cleaner edges. Both of these coats are well stippled.

The next operation is that of decorating. The headlinings receive three coats of rubbing varnish slightly thinned with turpentine which prevents any discoloration on the light painted work for the first coat, and pure varnish is used for the second and final coats. The majority of the ceilings are left bright.

The great feature of these ceilings is that they can be well washed at terminal points without any fear of water penetrating the joints and cracking or lifting it as would be the case with wood veneer work.

E. T. Condon (N. P.): From my experience of over thirty years in painting cars, no material has been found, up to the present time, more suitable for headlinings than the three-ply wooden lining. When surfacing, if the wood has an open grain, fill, varnish and rub. With poplar use outside body surfacers up to the color coats. The back of the lining should be made as nearly waterproof as possible. First, all the paper glued over joints should be removed and the back of the lining before being put into the car should be thoroughly primed and then given two good coats of oxide of iron paint, the last coat to contain a good proportion of spar varnish, or a varnish that contains a hard gum. When the face of the lining is brought up to the color coats, and the back is thoroughly painted, the lining should be put up; putty all the nail holes and joints, and proceed with the color.

About twenty-five years ago our people bought the first cars with a veneer lining. We have some of those cars on the road today with their linings in a fairly good condition. These cars were roofed with a good quality of tin and about every three years the headlinings were cleaned up and given a coat of varnish. For ten or fifteen years we had no trouble with veneer blistering or buckling as we do today on comparatively new cars and in order to maintain our old and new linings we must first maintain the roofs. In the purchase of new cars specifications should demand that all the linings should have three good coats of paint on the back, painted in the manner I have suggested, and special attention should be given to the roofs. In

the majority of cases leaky roofs are the cause of all blistering and buckling.

The discussion of this subject showed that there was considerable trouble experienced with all kinds of headlinings, and to give the sense of the convention Mr. Cook make the following motion: "The convention is of the opinion that any of the standard headlinings in use are suitable from the painters' standpoint, provided they are properly made and seasoned before being put in place, that they be protected by at least three good protective coats of paint on the back and edges, and that they be properly put up in the car." This motion was carried.

CLEANING PAINTED PARTS OF LOCOMOTIVES.

John D. Wright (B. & O.): The prominent parts of a locomotive, such as the tank, cab, dome and sandbox casings, boiler-jacket, driving wheels, etc., are usually painted with more care than the less prominent parts, and they are also cleaned better at the roundhouses, while the locomotives are in service. For such parts, I have not found a better method of cleaning than the old-fashioned way of scrubbing with a neutral soap, pulverized pumice stone and water, not forgetting to apply plenty of elbow grease, and to rinse off all traces of the soap. It may be necessary, occasionally, to scrape off an accumulation of dirt, or remove an excess of grease, washing certain parts with benzine and wiping dry with waste. This, however, should always be done before washing with soap. The less prominent parts, such as frames, trucks, truck-wheels, pipes, etc., which receive less cleaning during the period the engines are in service require somewhat different treatment. There is often a thick accumulation of dirt and grease on some of these parts which cannot be removed with soap and water. This is best removed by scraping with scrapers, or a putty knife, and then washing with benzine and wiping dry with waste.

The benzine we use for cleaning purposes runs from 54 to 58 deg. Baumé. It is not very much lighter than coal-oil, which runs from 46 to 48 deg. Baumé, and is not nearly so inflammable as the 68 deg. Baumé gasoline used in torches, commonly known as deodorized stove gasoline. The fire insurance inspectors object to the use of inflammable liquids around shop buildings, but up to the present time, I have been unable to find a suitable substitute for benzine which will clean the greasy parts of a locomotive as effectively as this petroleum product.

Mr. Quest: I do not see how we can get along without benzine in the paint shop. There is nothing that will take its place.

A. P. Dane (B. & M.): On the Boston & Maine, the motive power department has been restricted in the use of benzine. We used turpentine until it got to be 75 or 80 cents a gallon, and I suggested a substitute for it, which we have been using for the last two or three years. It is about one-half the price of the pure turpentine.

Mr. Butts: Our method is to take kerosene oil, and clean thoroughly with that, and then take a piece of waste, saturated with a substitute for turpentine—we have one costing 32 cents a gallon, which satisfies as to the flash point danger—and clean off the face of the work that needs to dry the hardest, and where there would be objection to slow drying, and wipe off the surplus oil with that. At one point I found that they did not have a substitute for turpentine, and the man had gone to a sawmill and got very fine sawdust, and after taking off the worst grease with kerosene oil, he had taken waste and rubbed the fine sawdust into it, and had gone over it with that. It didn't cost anything but the labor, and was a very good job.

Mr. Dane: We have used kerosene, for instance, on the eccentric straps, driving boxes, inside of drivers, and the motion work. The grease is an inch thick sometimes, and it is scraped, and kerosene is used. I find it almost impossible to paint over anything cleaned with kerosene and nothing else. It leaves an oily surface, and it does not thoroughly clean. The turpentine substitute gives entire satisfaction.

PAINT MIXING VEHICLES.

A paper on this subject was presented in an interesting manner by C. E. Copp of the Boston & Maine. He mentioned various articles recently published in technical magazines which bore on this subject. In speaking of substitutes for linseed oil he quoted from a paper written by Maximilian Toch, and published in the proceedings of the Paint and Varnish Society of London, Eng., as follows: "In speaking of fish oil, it has been stated that menhaden oil properly bleached or refined does not produce as hard a film as linseed oil, but this I am inclined to dispute. If raw linseed oil is mixed with a pigment, it makes a very poor, spongy, badly adherent film, but if a good drier is added with the proper kind of a dilnent, this is overcome. The same is true of fish oil, and if fish oil is treated with the proper tungate drier, the film produced has a number of advantages over linseed oil." Mr. Toch also speaks favorably of China wood oil and soya bean oil. Quoting from a New England railway chemist, Mr. Copp says: "Soya bean oil so much resembles linseed oil that it is difficult to detect the difference, and it is produced at about one-half the cost of linseed oil. In regard to turpentines, there are many substitutes, the most of them consisting of about 75 per cent. of a carefully distilled petroleum oil and 25 per cent. of turpentine."

Mr. Copp believes that there are many of these substitutes that can be used to good advantage, if not in all work, on a certain class of work. He says, "I have seen a board exposed two years on one-half of which the semi-paste paint was thinned for use wholly with a substitute paint oil, the other half with linseed oil, and the half with the substitute oil looked the best. I believe that for freight car work, if the semi-paste paint is furnished ground in pure linseed oil it can be safely thinned with a very nearly all substitute paint oil. But for passenger car work, especially when one prepares his own primers and surfacers of lead and oil, I would advise adherence to the use of linseed oil, and the purer and better prepared the better."

When speaking of turpentine he again quotes Mr. Toch as follows: "Turpentine has absolutely no value whatever as a binding paint material. If turpentine is flowed over a sheet of glass there should be no residue left on the glass after it has stood for twenty minutes. Now if a petroleum product is considered that will also evaporate in twenty minutes, and one which contains no product that is harmful to the pigment or the oil, and one which gives fluidity and unctousness to the paint or varnish, and which costs one-fourth the price of turpentine, I say that we are pulling the wool over our own eyes to use turpentine, if we can demonstrate that the petroleum product is equal." A substitute can be made by mixing varnish makers' naphtha and pure spirits of turpentine in such proportions as is suited to the work at hand. Such naphtha should have a specific gravity of 60 deg. Baumé, or the deodorized varnish makers' naphtha may be used and 2 parts of the latter mixed with one part pure turpentine will meet all requirements.

OUTPUT OF THE PASSENGER CAR PAINT SHOP.

T. J. Hutchinson (G. T.): The output of the passenger car paint shop is dependent on the following departments: The stores department; the traffic department, and the different branches of the car department. The first move towards reform, I believe, must be made through the stores department by the introduction of a more vigilant co-operative system in the purchase and punctual delivery of all staple material. Due allowance of course, must be made for all unforeseen difficulties that have to be met in obtaining material for special purposes.

Unfortunately on some of our railway lines the passenger traffic department officials are permitted to independently control the care, and maintenance of their passenger equipment in service, and wherever this system is in vogue with the usual in-

experienced help employed at terminal points, the tendency is inevitably towards neglect, and extremes of service, both of which so long as the above conditions exist are unsurmountable obstacles in the path of the master painter working with an eye toward quality and economy, as well as the maximum output. To safely keep up railway passenger equipment in service it is pretty generally understood that all first-class cars should be shopped for general repairs every twelve or fifteen months, and this particularly applies to the exterior painting.

Not many years ago it took from one to three months to properly paint a railway coach. Railway managers generally became dissatisfied, and demanded a sytsem that would shorten this time, but mark you, without impairing the durability of the work. Railway service is the most severe test you can give paint or varnish, and the work of days cannot be safely crowded into hours, as the quicker drying you make your paint or varnish, the shorter lived is the work; but this problem has been satisfactorily solved in the production of the railway coach surfacers now in use on the principal railway lines of this country. Upon the approach of the busy season we find insufficient shop capacity, and antiquated machinery a great obstacle to handling equipment in order, and getting it through the shops on time. Shop capacity could be greatly augmented by having the yard tracks adjacent to the shop equipped with heat, air and water service pipes, where much preliminary work, such as stripping, and interior washing might be done.

In order that there may be no delay in the repair of car fittings all interior coach equipment should be removed in the yard and sent to the shop for washing, and the necessary cabinet shop repairs. Of course in winter the outside sash and doors can be left in place until car is shopped. This will decidedly advance the work in the cabinet and sash rooms, allowing much needed time for the varnish to harden before the trimmers take the car to fit it up for service.

G. W. Lord (B. & M.): There are many departments hindering the output of the passenger car paint shop; perhaps unavoidably in trying their best to keep up their end. So every department from the head down should be on the lookout for these delays and try to overcome them as much as possible. By so doing, they will help the output. There should be a competent man looking after the stripping of all coaches, looking after every piece removed; see that it is all right and in condition to go back before it is sent to the paint shop. If parts are broken or missing, or there are changes to be made, they should be replaced and fitted at once, not waiting until the coach is to be hung up, then telling us this or that has got to be done.

Foremen of the different departments should work closely together all of the time. Get together occasionally and compare notes, so that when the coaches are ready to hang up, all the parts will be complete, and nothing be waiting to be done; thereby you avoid holding the car, which is taking up valuable room. When you take coaches out of the paint shop you should have others to take their places, or your men will soon be out of work. Sending out four or five coaches today, then waiting for several days before filling their places, does not help the output of any shop, but delays it. I do not mean filling the shop with old or unrepaired coaches, but coaches that have been overhauled and ready for the painters to continue their work.

Changing over the steam heating, air brakes, signal valves, tool boxes in the saloons, burned or water soaked head linings or taking down lamps, and many other things should be done as soon as possible after the car comes to the shop. If this is done, you will help the output. Holding cars for some missing or broken part, after you have worked nights and Sundays to get them out on time, does not help the output, and the poor painter at the end of the month is blamed for not putting out more cars. There is but one solution to get best results and that is to have all the departments work and pull together, by so doing you will help the output.

Mr. Brazer: It won't do you painters any good to talk on this if you talk until doomsday. You are the last ones to get the car. Mr. Lord says you must have the co-operation of the other departments. That is, of course, true. The only way is to have the general foreman of the car department a broad-gage fellow, and as much interested in the paint shop as in the cabinet shop. Mr. Butts started to stop permitting any work being done in the paint shop. He says he can't varnish the car well if you are going to raise dust in there. We, of course, knew that, but they were after us for cars. The corporations do not own enough equipment to properly protect their paint shops. The men in the position I am in know what you are up against, and we appreciate your position. It is the car department men that have to give you the work before you can finish it.

Mr. Hutchinson: I wish all the master car builders and superintendents would take as much interest in the paint shop as my friend Mr. Brazer does. It would tend greatly to add to the efficiency and increase the output of our paint shops.

LINSEED OIL.

W. O. Quest (P. & L. E.). Notwithstanding all interested adverse claims made, we are still firm in the belief that the sellected, especially prepared, old reliable linseed oil is the king of paint and varnish oils, basing this conviction and claim on the fact that with but few exceptions, if any, the best substitute reducing oils of the past and today contain certain fixed percentages of linseed oil, the quality and price usually being based on the quantity of linseed oil used in the combination of the cheaper selling substitute. The substitute paint oils of today are the undoubted achievement of a demand backed up by brains; we consequently have no hesitation in openly saying that it is our honest belief that the quality of the best grade of the so-called substances, or reducing oils, is much better than it was fifteen years ago; that this improvement, owing to demand, has been steady and substantial, the proof of such a statement being the fact of the sale of thousands upon thousands of increased gallons of the product each year. It is our further belief that there is no one special consuming craftsman of today, fully capable of stating the many safe uses that a first-class substitute paint oil can be put to. Individually, for many years, we have been safely using these oils in our shop formulas.

The best substitute paint oils being purposely made more volatile in their make-up, certainly have a great advantage over the best straight linseed oil in the car paint shop, which in many instances is ruined where attempting to promote its drying qualities with a non-assimilating cold-stirred-in-Japan, which as a rule, has nothing to recommend it other than its cheapness. We have safely and economically, in both time and labor cost, substituted paint oils in our freight painting department for over twenty years. We have also safely used the same material throughout in our general all paint finishing work which needed reducing. We have no hesitation in saying that we think the manufactured paint oil to be one of the most indispensable of materials in the car paint shop formulas, that, where skillfully judged for quality and use, there is only one greater mistake that can be made, which would be the mistake of trying to advantageously operate a railway car and locomotive paint shop without the use of a judged safe, first-class substitute paint oil.

ELECTION OF OFFICERS.

John T. McCracken, of the Interboro, New York City, was elected president; A. J. Bush, Delaware & Hudson, Oneonta, N. Y., first vice-president; O. P. Wilkins, Norfolk & Western, Roanoke, Va., second vice-president, and Albert P. Dane, Boston & Maine, Reading, Mass., secretary-treasurer. The places receiving the three highest number of votes for the next place of meeting were Denver, Colo.; Cedar Point, Ohio, and Boston, Mass., in the order named.

SHOP KINKS.

From the Juniata Shops of the Pennsylvania.

MILLING CUTTERS FOR SIDE RODS.

A new type of milling cutter to be used in milling fluted side rods is shown in Fig. 1. The cutters are formed to the true shapes of helixes instead of being straight as was the former practice. The helical blade gives a constant cutting edge for the full width of the cutter, while the straight edge has a variable cutting angle which is too acute at one end and too obtuse at the other, and correct only at the center. Each cutter blade has three cylindric bushings secured by set screws, the bushings having a flat taper face which wedges against the blades when the screws are tightened up, holding them in position.

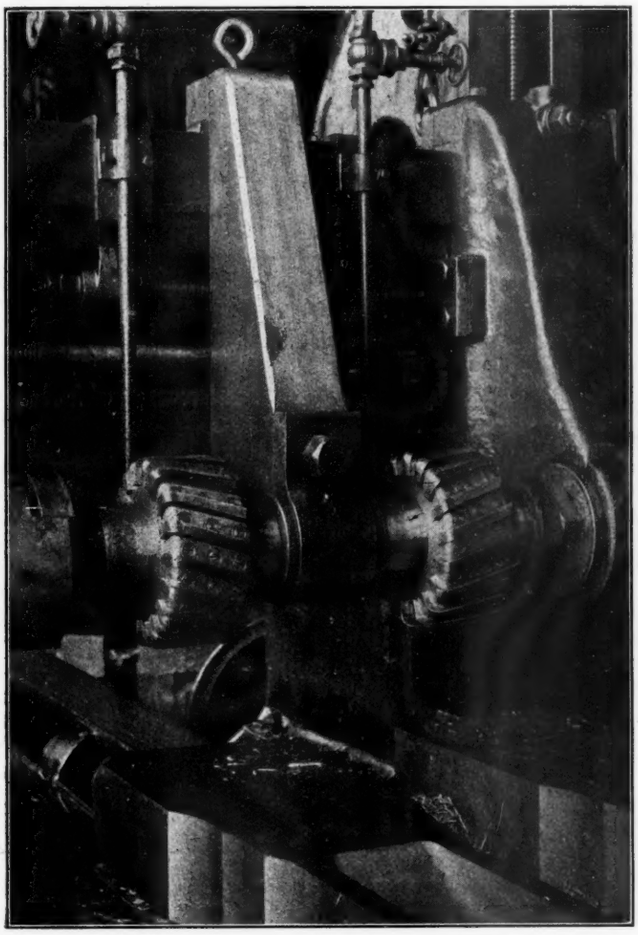


Fig. 1—Milling Cutters for Fluting Side Rods.

While this method of securing the cutter blades may appear to be expensive, it is found that the milling cutters of any diameter can be made for a considerably less cost per inch of width than is charged by the manufacturers. To provide the necessary rigidity the hole for the arbor is made one-half the extreme diameter of the cutter. In order to hold the arbor firmly against the work a substantial intermediate support is supplied, which shortens the span of the arbor between the bearings. This rigid construction materially increases the output of the machine, as it does away with chattering and enables the operator to run with a heavier feed.

Fig. 2—Tire Heater with Rotating Table.

TIRE HEATER.

A tire heater of simple construction and one that will take care of about 29 locomotives per month is shown in Figs. 2, 3 and 4. It consists of a furnace with only one burner and a

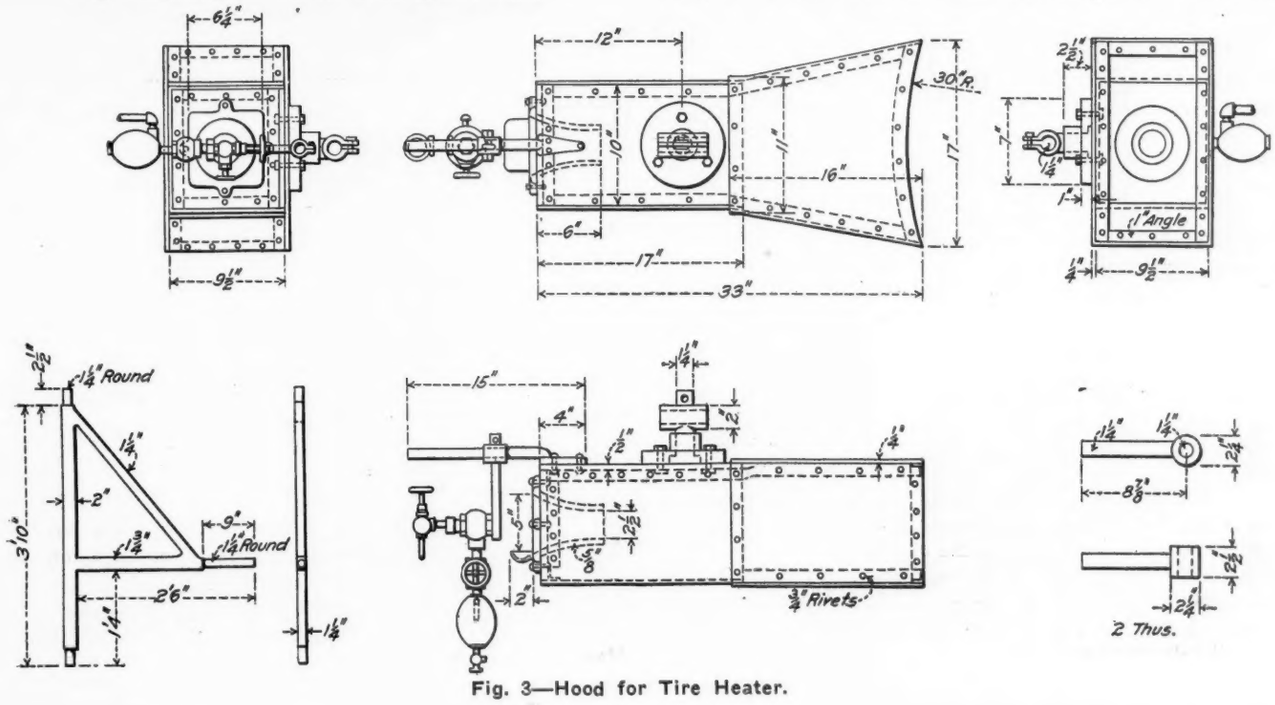


Fig. 3—Hood for Tire Heater.

turntable which will hold two tires. The table is revolved as fast as the portion of the tire in front of the furnace becomes sufficiently heated. The furnace or hood is lined with firebrick and is suspended from the wall by a small crane, as shown, so that it can be moved up to and away from the table according to

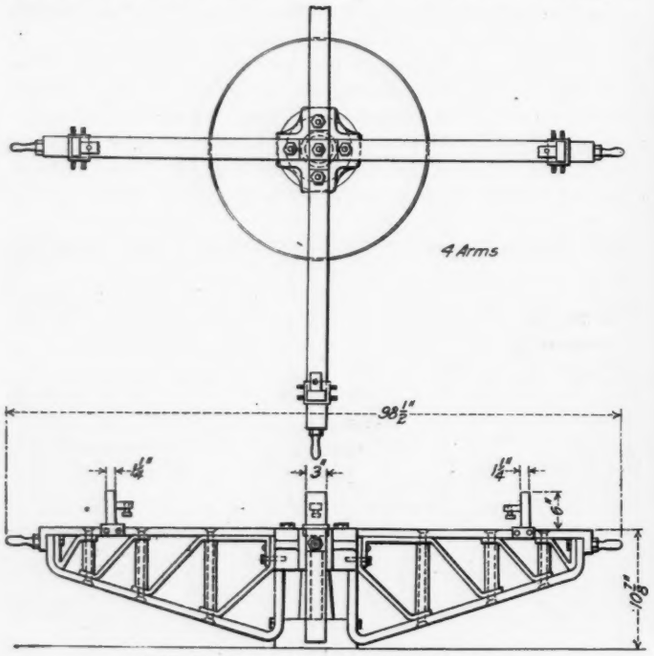


Fig. 4—Turntable for Tire Heater.

the different diameters of the tires to be heated. This method has been in successful operation for several years.

MILLING CUTTER.

An interesting type of a hob milling cutter with inserted teeth is shown in Fig. 5. These teeth have a rather unusual form, being triangular in section. They are inserted in circular holes

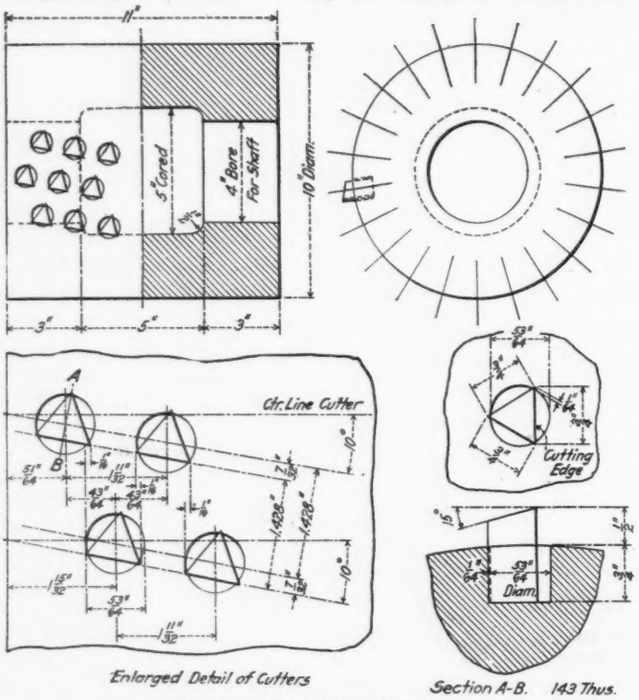


Fig. 5—Hob Milling Cutter.

and are held in position by segmental wedges. They are prevented from rotating by the apexes of the cutters overlapping the circular holes by 1/64 in. With this type of cutter little work is required in dressing the teeth.

CUTTING OUT ROD ENDS.

A novel method of cutting out the jaw ends of side rods is shown in Fig. 6. A gang cold saw is used with the two saws set the required distance apart. Instead of the slow reciprocating motion of the slotter the work is done by the continuous cutters working at a much faster rate of feed. When the saws have cut in the required distance the core may be drilled out and the jaw will be ready for finishing.

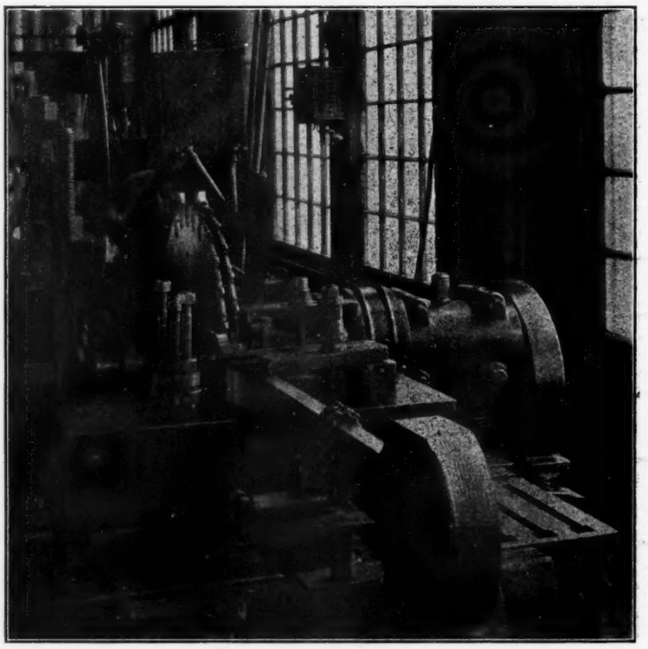


Fig. 6—Gang Saw for Cutting out Rod Ends.

MILLING CUTTER FOR BEADING TOOLS.

The milling cutter shown in Fig. 7 is made for the renewal of the boilermaker's beading tools. With this cutter the tools may be easily maintained to the standard size at a small cost. It is composed of six cutters shaped to the exact size of the beading

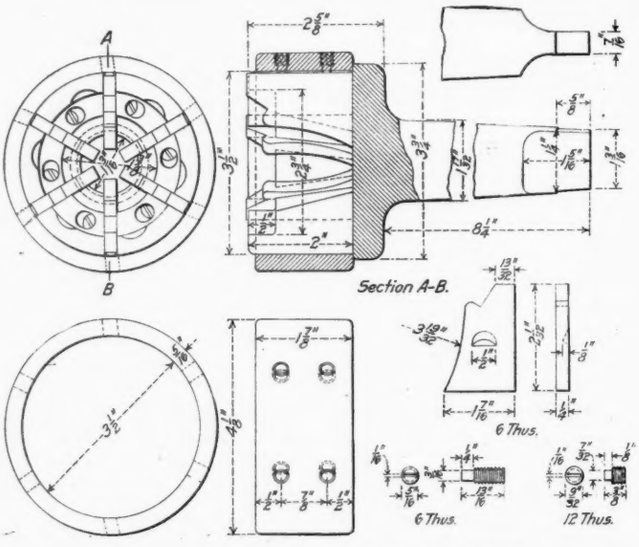


Fig. 7—Milling Cutter for Beading Tools.

tool. These cutters are held in slots in the body of the tool by set-screws fitting in notches in the side of the cutters as shown in the bottom view of the tool. They are adjusted by set-screws in the band which has a close fit over the body of the tool. The tool is used on a drill-press.

TRIMMING PRESS.

A 100-ton trimming press that is found useful in connection with a heavy drop hammer is shown in Fig. 8. The main ram is 14 in. in diameter, and has a stroke of 18 in. It is provided with a rapid return acting through a smaller piston. The water pressure used is 1,500 lbs. per sq. in. The crosshead is heavily guided in the main frame so as to take up any side strains that are liable to come on the machine when trimming. The distance between the base and crosshead is 36 in., and the width between the housings is 36 in. The main cylinder frame is made in a single casting and the valve mechanism is arranged so that the stroke may be adjustable. The operating valve is made by R. D. Wood & Company, Philadelphia, Pa., and is of their standard patent piston type, made of hydraulic bronze.

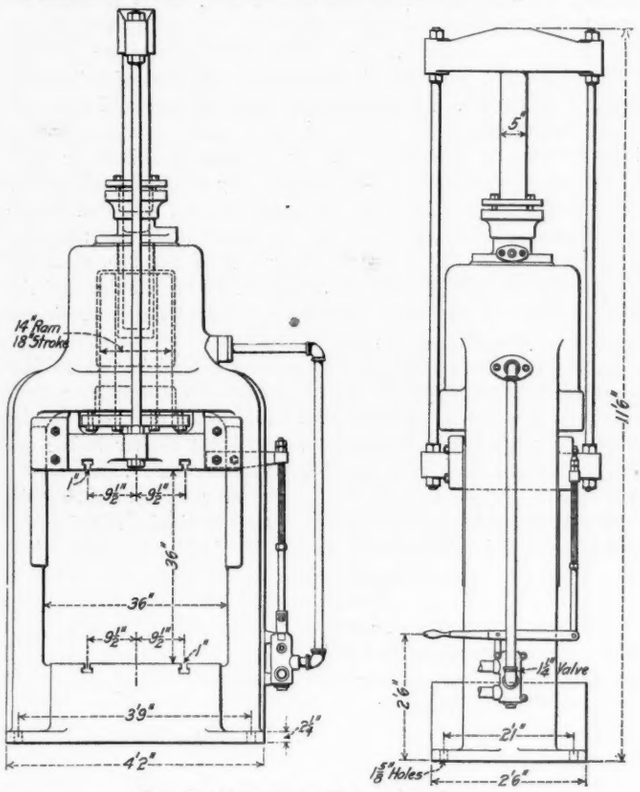


Fig. 8—Hydraulic Trimming Press.

An abstract from the *Painters' Magazine* was read at the recent Painters' Convention, concerning the origin and production of gasoline, benzine and naphtha, as follows: Petroleum, benzine is also called naphtha, and there is no real distinction between the two terms. However, there is a decided difference between benzine and gasoline. The latter is used as a fuel for lighting, while benzine cannot be used for this purpose without serious risk. When benzine is manufactured the product is designated by its specific gravity in degrees on the Baumé hydrometer, and the higher the degree the higher its volatility. At the present time 65 deg. is the most volatile benzine or naphtha, and anything over that degree—68 deg., 72 deg., 76 deg.—is termed gasoline. When crude petroleum is subjected to distillation the resulting products are—first the so-called gasolines, which boil and volatilize at low temperatures. The lightest of these is used only in gas machines, and as a solvent, and is known as 84-deg. gasoline. The next is 76-deg. gasoline, commonly used in gasoline stoves, lamps and automobiles, gas engines and motor boats. The 72-deg. and 68-deg. gasolines are sold for similar purposes, but in low temperatures do not work so well as the 76-deg. gasoline. Of the petroleum naphthas or benzine the 68-deg. article is most commonly used for cleaning, etc.

NOTES FOR THE ENGINEMAN AND FIREMAN.

BY F. R. WADLEIGH.*

However well a locomotive may be designed its operating economy will be low, unless it is handled intelligently and fired with care and skill. A really good fireman will effect greater economies than any apparatus on the locomotive. The effective carrying out of all plans and schemes for the economical use of fuel on locomotives comes to depend finally on the interest, cooperation and skill of the engine crew; but, upon all factors affecting fuel consumption the fireman has the greatest influence. His work can spoil or render ineffective the best coal and the most efficient design of locomotive; on his intelligence and industry depends largely the expenditure of $188,735,868.00 (paid by the railways of the United States for coal in 1909), which is 12¾ per cent. of the total operating costs of the railways. He may, by the exercise of the utmost skill and intelligence, turn into steam 80 per cent. of the heat value of the coal, or by careless firing and ignorance, may easily waste 30 per cent. of the heat units in the coal, and only utilize 50 per cent. Of course, the quality of the coal and the design and the economical rating of the locomotive have much to do with the results obtained by the fireman, but skilful firing and handling of the locomotive can very largely neutralize poor design and overloading, just as good coal can, and is often made to, overcome the poor condition of the locomotive.

There is more coal wasted by careless firing than in any other way, and while some firemen are better than others, no man of ordinary intelligence can afford to do anything but his best. The fireman should look upon the coal as so much money entrusted to his care by his employer, to be used in the most careful and intelligent manner and from which he is to get the greatest returns. A good fireman is a skilled workman and should be ashamed to turn out poor work, just as a skilful mechanic is. The difference to the employer, in dollars and cents, between a good fireman and a poor one is certainly a great one. Anything in the way of written or printed suggestions that will help the fireman in his work will not only be of value to the man but also to his employer—the railway; it is hoped that the following suggestions, gathered from years of practical experience and study, will be of assistance to both.

The engineer and fireman should remember that all instructions are given them to think about and to find reasons for, so that they may be applied to varying conditions, as it is obviously impossible to give reasons and detailed instructions covering all points and conditions applying to fuel consumption without going into the matter at too much length. The mere giving out of such instructions is not sufficient in order to get results. The rules given should be carried out here, there and everywhere, not only on fast passenger trains but on slow freights as well. Everyone connected with the handling of locomotives should have copies of such instructions and be made to take an interest in their being carried out. The trainmaster, as well as the road foreman or traveling engineer, should be aware of the importance of the subject and should see that any firing instructions issued are carried out just as much as the train rules are.

If the railways expect their engine crews to be interested in fuel saving and insist on their carrying out reasonable and proper instructions to that end, they must keep in good condition all appliances affecting the use of fuel. It is not very encouraging to a fireman to know that a hundred or more flues are stopped up on his locomotive, and that when the engineman reported "clean flues" on the work report book to find, on going out on next trip, that only the small holes have been bored through in a few bottom flues and that the rest are as bad as they were on the previous trip. It is such occurrences (and they are not uncommon) that are largely responsible for the lack of interest and care shown by engine crews in the matter of fuel

*Fuel Engineer and Ass't Gen'l Manager; Chesapeake & Ohio Coal & Coke Company.

economy. Where one finds a road that keeps the flues clean and firebox and arch in good order, that does not have steam leaking around the piston rod and the valve stem packing, that keeps the valves square and the cylinder packing tight, there will also be found a road whose men take an interest in the fuel question.

There are several ways in which locomotive fuel is wasted with which the engine crews have little or nothing to do. Careful tests made not long ago showed that not less than 15 per cent. of the fuel supplied to locomotives performed no part in the actual moving of trains, but was accounted for in other ways. For instance, keeping more locomotives in service than are needed by business requirements, delays in yards and at meeting points, unnecessary stops, ordering locomotives out before they are needed, carelessness in cleaning and building fires, schedules divided up without taking into consideration the grades and curvature of the road. Every 15 or 20 minutes' delay may cost from 500 to 1,000 lbs. of coal, according to the state of the weather. In fact, everyone, from the general manager to the brakeman and the wiper, each and all affect, by their methods, the coal consumption of locomotives.

DISPOSITION OF HEAT IN A LOCOMOTIVE FIREBOX.

Tests on the distribution of the heat of the coal used in a locomotive, carefully made under the direction of Prof. Goss, showed the following results, a good Pennsylvania or West Virginia coal being used. (Bulletin 402, United States Geological Survey.)

	Percentage of Total Heat in Coal.	
	Used.	Lost.
Absorbed by water in the boiler	52	..
Absorbed by steam in the superheater	5	..
Lost in vaporizing moisture in coal	..	5
Lost through discharge of carbonic oxide gas	..	1
Lost through the heat in gases going out of stack	..	14
Lost by unburned coal in front-end cinders	..	3
Lost by unconsumed coal thrown out stack as sparks	..	9
Lost by partly burned coal in ashes and clinkers	..	4
Lost through radiation of heat by boilers and cylinders, leaks of steam, water, etc.	..	7
	57	43

Now this statement applies to the locomotive only when running and not blowing off steam, and it does not include the coal used while standing, starting fires, and switching. Prof. Goss states that about 20 per cent. of the total locomotive fuel is used in the ways just mentioned, or is left in the firebox at the end of the run; so that the heat balance given above accounts for about 80 per cent. of the total fuel.

During the year 1906, there were 51,000 locomotives in the United States, which consumed not less than 90,000,000 tons, of coal, costing the railways $170,500,000. Applying the heat uses and losses given, we get the following results:

	Tons.
Consumed in starting fires, in movements in yards, going in and out of sidings, in leaks and safety valve losses, and while standing	18,000,000
Used; that is, represented by heat transmitted to water in boiler	41,040,000
Required to evaporate moisture in coal	3,600,000
Lost through incomplete combustion	720,000
Lost through heat of gases going out of stack	10,080,000
Lost through cinders and sparks	8,640,000
Lost through unconsumed fuel in ash and clinkers	2,880,000
Lost through radiation, leakage, etc	5,040,000

Some of these losses—that due to moisture in the coal, the loss due to incomplete combustion, and those due to radiation and leakages, are not likely to be much reduced in ordinary locomotive work; the losses due to the heat of gases going out of the stack and those due to cinders and sparks can only be lessened by changes in the design of the locomotives, such as increased grate area, or by special appliances, such as smokebox superheaters and feed-water heaters, hollow brick arches, etc.

Greater care in the selection of the coals used and more care in their mining and preparation will tend to reduce all losses. But, after all, these ways of reducing the losses of heat in the coal are carried out, it is the engine crew that has to look out for them all, and it is to their watchfulness and skill that the greatest saving may be looked for. They can spoil the working of any design or appliance and cause good, well prepared coal to show poor results.

CLINKERS.

A coal that will make bad clinkers is one of the worst propositions the fireman has to contend with, and a little information as to what causes them will be of use. It takes a certain amount of heat or temperature in the fire to cause the clinkers to form from the ash of the coal. This temperature varies with different coals, but as soon as it is reached the clinker begins to form. Now this fusing point or melting point of the ash is largely determined by the kind of substances composing the ash. Some substances such as lime and iron will lower the melting point, so that a coal containing much lime or iron is sure to clinker badly, not because the iron or lime clinker or fuse themselves, but because they make the ash clinker more easily. There is, however, another item, and that is the temperature of the fire at or near the grates. If this temperature is not as high as the melting point of the ash, then the latter will not fuse into clinkers. So, the hotter the fire and the more it is sliced and disturbed near the grates the more chance there is of having clinkers.

Recent careful tests show that some coals clinker at as low a temperature as 2,200 deg., while others do not clinker until the temperature reaches 2,900 deg. The latter coal, one of the New River West Virginia variety, would not clinker in the ordinary firebox, as it is very seldom that the heat reaches over 2,400 deg. On the Pennsylvania locomotive tests at St. Louis, where most careful measurements were made, the heat in the firebox when working light ran from 1,400 to 2,000 deg., while when working hard it ran between 2,100 and 2,300 deg., the highest being 2,339. It is not always the coal making the most clinkers that will cause the most trouble, as it may make a large amount of light porous clinker that can be easily broken up and will not stick to the grates, while another coal may make a comparatively small amount of thin, glassy clinker that sticks to the grates and stops them up and cannot be removed until it gets cold.

The way in which the firing is done often has much to do with clinkering; the man that carries a very heavy fire and is continually digging holes in it, thus getting green coal on the grates, turning the fire upside down and bringing the ash up into the hottest part of the fire, will certainly have more trouble than the man who is satisfied to let the ash alone where it belongs, on the grates, and who only hooks the fire to level the top of it. Another frequent source of trouble from clinkers is due to not building up the fire properly before starting.

IMPURITIES IN THE COAL.

The fireman should learn to know by their appearance the different impurities to be found in coal, such as slate, bone, iron pyrites, fire-clay, etc. Knowledge of these impurities is of value, as by throwing them aside better results may be obtained from the coal and less ash and clinkers be produced. The effect of the different impurities on the burning of the coal should be watched, as all such knowledge tends to more economical results. There is, of course, a vast difference among different coals in the amounts of such impurities; some coals are apt to have considerable slate, others slate and bone, etc., this difference being mainly caused by lack of proper preparation and inspection by the mine operator.

Appearance of Impurities and Their Effect on the Fire.—Slates are of irregular shape, generally more or less flat and are heavier and harder than the coal and vary in size. Their color runs from a light gray to black. Some of them are soft and easily broken, while others are very hard. Their effect on the fire is to add to the amount of ash and refuse; they take up space on the grates that would otherwise be occupied by coal and also add to the size of clinkers. Slates have no value as fuel.

Bone may be called a slaty coal or a carbonaceous slate. It is really an impure coal and the slate in it is not in layers but in

small particles mixed with the coal. It is harder and heavier than coal, of a darker color, and breaks into irregular shaped pieces. Sometimes it will be found in small pieces separate from the good coal and sometimes it shows in a layer in a large lump, just as it comes from the seam of coal. It is usually from ½ to 4 or 5 in. thick. Its only effect on the fire is to add to the amount of ash and to take the place of better fuel, but it will not clinker. It has considerable fuel value, varying in this respect; the harder it is the less fuel value it has. Analysis shows that it contains from 15 to 25 per cent. ash while the good coal will not have over 7 per cent.

Fire clays exist in small pieces or layers in the coal, soft, like putty and are generally of a light gray or reddish gray color. They are usually found below the seam of coal, but sometimes in the middle in thin layers. They add to the amount of ash and clinkers and have no value as fuel.

Iron pyrite is a bright yellow color, resembling gold or brass, coming sometimes in thin layers or flakes and sometimes in hard round, or partly round, balls, often in chunks more or less mixed with other substances. It is composed of iron and sulphur and not only has no practical fuel value but also is one of the main causes of clinkering, due to the iron it contains. Some coals contain very little pyrites, only a few flakes occasionally on the surfaces of the lumps, while other coals are full of it.

A form of lime is found on the surface of the lumps of some coals, and is of a whitish brown color. It is responsible for considerable trouble when it occurs in any large quantities, as it makes the ordinary ash fuse or run together, making a sticky, pasty clinker that runs into the spaces between the grates and stops them up. Good coals usually contain little or no lime, while some coals are almost covered with it.

WETTING COAL BEFORE FIRING.

The wetting of coal is such a universal practice on locomotives, as well as at many stationary plants, that a little information on the subject, which is not often discussed in books, may be of value. In the first place, coal will always be wet down on locomotives in order to keep dust from flying about, as a matter of comfort to the men on the engine, if for no other reason.

It is claimed by many chemists and engineers that coal should not be wet because:

First—Any moisture or water in the coal must be evaporated in the firebox, which wastes heat; the water must be raised to a heat of 212 deg., when it is evaporated into steam, and this steam must be raised to the heat of the gases in the firebox.

Second—That water in the coal is turned into steam which takes up valuable space in the firebox that would otherwise be occupied by the hot gases from the coal, and this reduces the draft. The steam from a given quantity of water takes up nearly 1,600 times the space or volume that the water did at the ordinary pressure and temperature of the atmosphere.

Third—That if the water is separated by heat into oxygen and hydrogen, their combustion gives no gain, as the heat it takes to separate them is just as much as will be gained by burning them.

On the other hand, the reasons given for wetting coal may be summed up as follows:

First—The comfort of the men on the engine.

Second—The coal is held together, especially if there is much slack, which prevents fine coal from being drawn out through the flues before it touches the fire, and, if a coking soft coal is used, it will coke more readily and make a better fire.

Third—Water vapor or steam in the firebox promotes combustion, lengthens the blue flame of the burning hydrogen and carbonic oxide gases, and the heat from burning these two gases more than makes up for the heat lost at first by separating the oxygen and hydrogen of the water.

Fourth—It keeps down the smoke by making the coal burn slower, giving the gases a better chance to mix with the air. When coal is first thrown on the fire it gives off at once a large amount of hydro-carbon gases (composed of hydrogen and carbon), which are usually given off faster than they can be brought into contact with the necessary amount of air for complete combustion. Now, if by wetting the coal we can hold back this gas a little, an advantage will be certainly gained by the burning of this gas, which is high in heating power, and some of which would otherwise pass out of the firebox unconsumed and make smoke.

Fifth—It prevents the loss of fine coal dust, which, if dry, would be blown away or lost by the shaking of the locomotive.

The writer knows of no actual reliable tests made on locomotives to settle this question. G. H. Barrus, in his book, "Boiler Tests," gives the following information:

> "In running a test on a double-deck horizontal return tubular boiler, using George Creek Cumberland coal, an amount of water equalling 5 per cent. of the weight of the coal used was added to the coal before firing, the result showing an increase in evaporation of 3 per cent. as compared with a test made on the day previous with dry coal. The coal used contained 6.7 per cent. ash."

G. R. Henderson, in his work on "Locomotive Operation," says:

> "The practice of wetting coal is due to an effort to keep down the dust and also prevent the dry, fine stuff passing to the stack without being consumed—in this it is effective, but no more water should be used than necessary to effect this purpose, as all such water must be evaporated in the firebox and absorbs otherwise useful heat."

It is believed therefore that, apart from the question of comfort of the engine crew, it is a good practice to always wet the coal, so that it goes into the firebox moist, but not dripping wet. It may be stated here that there is quite a widespread idea among enginemen and firemen that wetting some coals will cause them to clinker. This idea is a wrong one. The only effect that wetting coal might have on clinkering would be to prevent its formation or to make it less troublesome. It is a common practice in stationary plants to blow steam under the grates to prevent clinkers and also to keep the ash pit full of water, partly for the same purpose.

FIRING LOCOMOTIVES WITH MIXED COAL.

It frequently happens that more than one kind of coal must be used on locomotives on the same division or run. This is a matter over which the engine crews have no control, of course, but it is responsible for a large amount of trouble and reports of "poor coal." It should be the practice on every road to avoid, as far as possible, any mixing of coals on any one division. Coals of the same appearance and nature—two different coking or semi-bituminous coals, such as Pocahontas and New River, or two different gas coals such as Fairmont and Tennessee or Kanawha gas and Splint—will usually burn when mixed without any trouble, but coals of a different nature are very apt to give trouble from clinkers when mixed. Besides locomotives are drafted for one coal and consequently do not give good results with another coal. When coals of a different nature are used, such as a gas and a coking coal, different methods of firing are required.

That this mixing of coals is often detrimental to good results was shown some years ago on the Chicago & Northwestern, when a remarkable improvement in engine performance was gained by a change in distribution of coals, so that each principal division was given one kind of coal exclusively. Whatever the mixture may be the fireman should learn the difference between the coals, both in appearance and in their burning and how the mixture can best be burned.

CLEAN FLUES ON LOCOMOTIVES.

The importance of having clean flues can hardly be overestimated; and by clean flues is not meant the boring out of a hole through the flues, but a thorough cleaning, so that the inner surface of the flue is directly exposed to the flame and gases from the firebox. Dirty flues not only obstruct the draft, but also lower the amount of heat that can be transmitted to the water from the fire. It is likely that a large number of engine fail-

ures charged to poor coal were really due to stopped up flues. Before reporting the locomotive as needing a change in the draft by either moving the diaphragm or changing the size of nozzle or blaming the coal or the fireman, the engineman should always be sure that the flues have been thoroughly cleaned.

"Clean flues will put a lot of lump in a bad tenderful of slack." Yet cleaning of flues, one of the most important requirements about a locomotive, is neglected at most engine houses more than anything else about the engine. If locomotive flues were kept as clean and were cleaned as often as the flues in the average stationary boiler or in marine boilers, 50 per cent. of the failures would not be due to lack of steam, and the amount of coal used would be greatly reduced.

In any ordinary plant the flues are cleaned out with steam at boiler pressure at least once a day, and where they run in 8-hour shifts, on each shift. On board ship they are cleaned out usually on each watch. Locomotive flues should be cleaned out at the end of each trip with a blower, whether reported or not; the extra cost would be more than made up by more steam with less coal used. It is not uncommon to find a hundred or more flues more or less stopped up. The writer has lately seen a case on a large road where 242 flues needed cleaning on a passenger locomotive that was giving trouble and having delays on account of no steam, and the trouble was blamed on the coal. After the flues were cleaned the same tender of coal made more than enough steam, and much less coal was burned. The engine crew should watch the flues closely and try to have them cleaned as often as possible.

MAINTAINING STEAM PRESSURE.

The steam pressure should be allowed to vary as little as possible and the fireman should see that there is no change due to any inattention, carelessness or laziness on his part. When the steam pressure changes either way and the position of the reverse lever, the injector and the throttle are not changed and the speed is the same, the cause of such change must be due to a change in the condition of the fire, and the fireman should always try to find out what that change is. To do this he must watch the fire closely all over and see its exact condition, especially around the sides and ends of firebox. Variations in pressure are not only hard on the boiler and firebox, owing to unequal expansion and contraction caused by the change in heat on the outside and inside of the firebox sheets and flues which tends to make the flues leak, the sheets to crack and the staybolts to break, but such variations are also the cause of a waste of coal, as it will always take more coal and labor to raise the steam pressure than it would have taken to have kept the steam up.

Many firemen will put the same amount of coal on the fire at the same intervals regardless of the pressure. This is all wrong; firing should be regulated not only by the condition of the fire, but also by the pressure. It is not good firing to put in the same amount of coal when steam is at blowing-off point or is blowing off, yet it is often done by firemen who should know better. The position and lighting of the steam gage are often responsible for the uneven pressures, as the gage is sometimes placed in such a position that the figures cannot be readily distinguished by the fireman, especially at night. The gage should always be placed and lighted so that the figures can easily be seen from the regular places of both the engineman and fireman.

The Bolivian government has approved the proposal submitted for the construction of a railway from Yacuiba, in the southern portion of the country not far from the Argentine border, to Santa Cruz, the capital of the department of the same name, which will pass through a country rich in minerals and with great agricultural resources. The commerce of this section of the republic now passes by means of the highways and cart roads to Puerto Suarez, near Corumba, Brazil, on the Paraguay river. A railway will be built between Puerto Suarez and Santa Cruz.

WELDING LOCOMOTIVE DRIVING RODS.

BY HENRY BUCKERT,
Blacksmith, Delaware & Hudson, Carbondale, Pa.

Solid Intermediate Rods.—A method of welding solid intermediate side rods is shown in Fig. 1. Each piece is well upset with a ram, and a hook scarf is made as shown with a piece of 1¼-in. round iron, under the steam hammer. After the pieces are scarfed to the proper shape, place both of them in a long top fire with a poke hole in front and back. Both pieces should be put in at the same time, so as to have a uniform heat for welding. When sufficiently hot, place under the hammer in the position shown and make the weld. This type of weld has been made at the above mentioned shops in a satisfactory manner

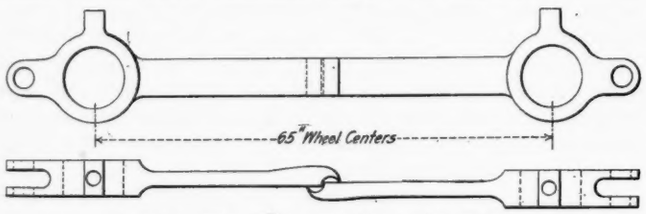


Fig. 1—Scarf for Welding Side Rods.

for the past six years, and with experience the weld can be made without the helper's having to strike a blow.

Repairing Worn Connecting Rods.—The rods sent to the shop for repairs should be annealed and closely examined for cracks after having been thoroughly cleaned of all paint and oil. If the holes on the back end are worn, old rod bolts should be riveted in as shown in *A*, Fig. 2. Also add filling pieces to the fillets to give additional strength to the rod. Two pieces, 2 in. x 8 in. x 12 in., shown in *B*, and two pieces of 1 in. x 5½ in. x 12 in., shown at *C*, are then forged from an old car axle, porter rods being forged in the pieces to provide handles for the tongs. The rod is then heated in a large hollow fire and each piece is welded

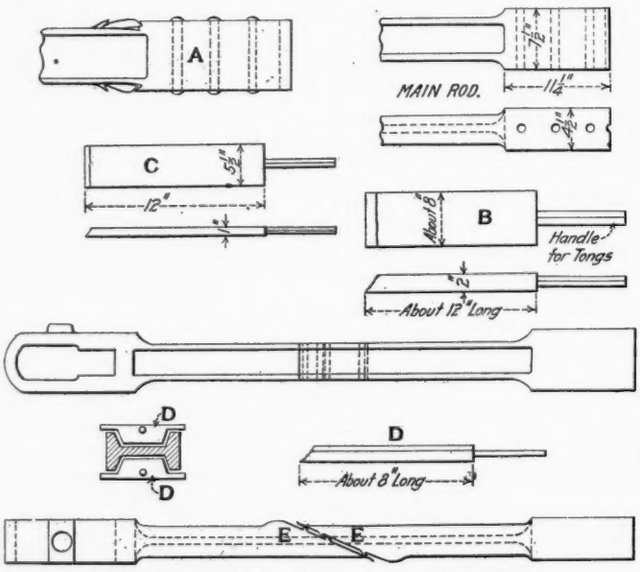


Fig. 2—Repairing Worn Connecting Rods.

on separately to the four sides. Too much borax should not be used in the welding, as it will form a scale that cannot readily be brushed off, and care should be taken not to burn the metal. After all the pieces have been welded to the rod it may be finished under the steam hammer. These repairs can be made in 15 hours. When a rod is broken in the channel section, forge out filler sections, as shown at *D*, and weld to the rod. Upset the rod at the fillers and scarf as shown at E. Put in a few notches so that the scarf will not slip when making the weld, and if the scarf appears to be a little loose, put in a small dutchman on each side. Allow about 2½ in. for the weld.

SHOP KINKS.*

BY H. C. WILSON,

Tool Room Foreman, Southern Railway, Spencer, N. C.

TUBE CUTTER.

A tool for cutting tubes from boilers is shown in Fig. 1. It consists of a machine steel body *A*, a cast steel tool holder *B*, and a high speed steel tool *C*. One end of the body is turned to fit the tube and a 1¼-in. hole is bored part way through it and 5-16-in. off center for the tool holder. There are two slots, 7-16-in. and ⅝-in. wide, cut in the body one-half the way through, one for the tool, and the other for the pin which drives the tool holder. The other end of the body is slotted out for a knuckle joint connection. The tool holder is turned to fit the hole in the body; it has a hole for the pin and a slot in which the tool is held by a set screw applied from the end of the holder. The dimensions of the tool are shown on the drawing. It is not hardened and has cut as many as 800 flues with one grinding.

To set the cutter, place the tool holder in the body and adjust the tool so that it extends beyond the body on the thin side, but not on the thick side. Have the tool face the thick side and clamp in position by the set screw. Place the body in the tube up to its shoulder and put in the driving pin so that it rests against the thick side. Turn the body so that the pin will be driven by the thin side. One revolution is sufficient to completely cut off the tube. This tool costs about $3, and the cutters from 4 to 5 cents each.

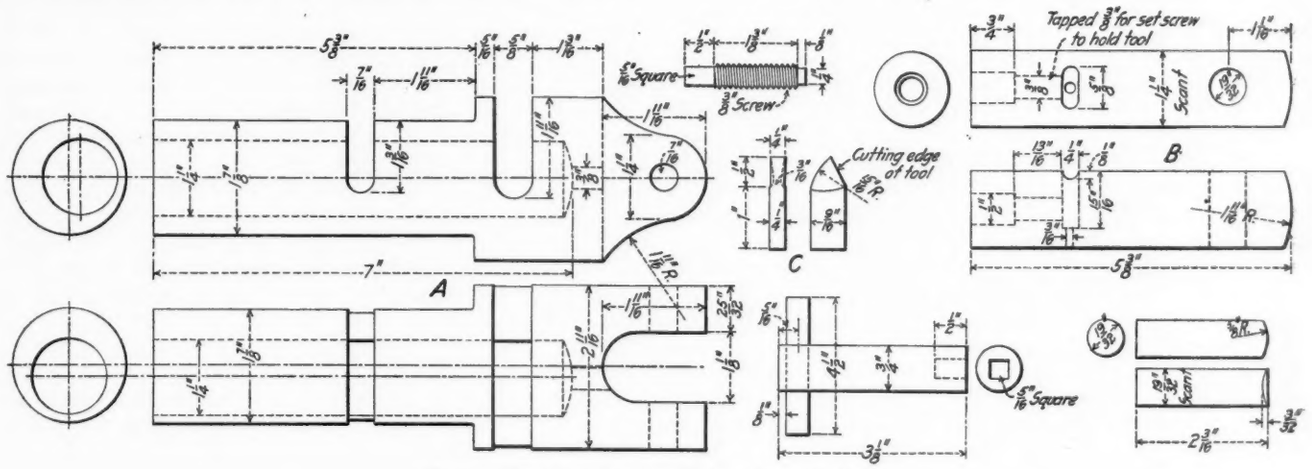


Fig. 1—Tool for Cutting Tubes from Boilers.

GREASE PRESS.

A grease press for forming grease for rod cups is shown in Fig. 2. It consists of a cylinder, inside of which is a left hand worm that grinds and forces the grease out through a brass nozzle ⅛ in. less in diameter than that of the rod cup. A knife at the end of this nozzle is used to cut the grease off to the proper lengths. Beyond this is an angle iron which catches the grease as it is cut off. The worm is driven by an air motor through a system of gears. The grinder is mounted on two 10-in. channel irons. A small angle iron is bolted across these channels at the rear to support the air motor.

*Entered in the shop kink competition which closed January 15, 1911.

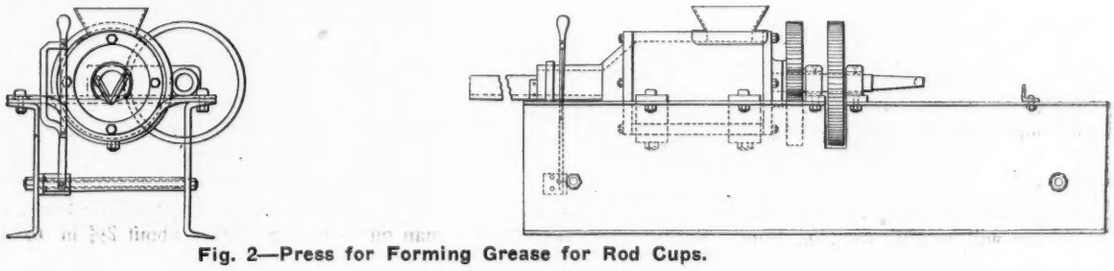


Fig. 2—Press for Forming Grease for Rod Cups.

CHUCK FOR BROKEN TWIST DRILLS.

The details of a chuck used to hold and drive twist drills that have had the tapered shanks completely broken off is shown in Fig. 3. The drills are held in V-jaws which have pins inserted in them to fit the flutes of the drill. The jaws fit in a machine steel body and are made with their outside surfaces conical to fit the nut, which screws down over the steel body and forces the

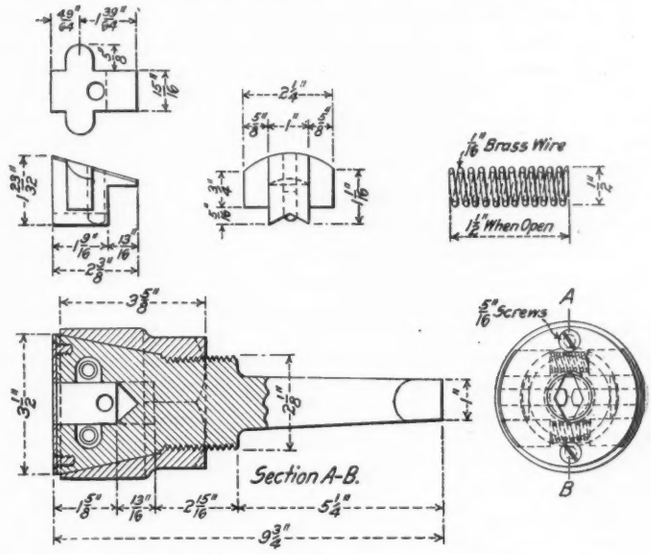


Fig. 3—Chuck for Broken Twist Drills.

jaws to grip the drill, holding it fast the pins keeping the drill from twisting. When the nut is loose, two helical springs, fitting in between the lugs on the jaws, hold them apart so that the drill may be easily inserted. A cover plate fits over the ends of the jaws and holds them in place. The body of the device is provided with a tapered shank to fit the drill press; it costs about $5, but soon pays for itself by prolonging the life of drills.

THE TRIALS OF AN ENGINE HOUSE FOREMAN.

BY ONE OF THEM.

If the average engine house foreman were asked what he considered the main essential to the prompt and efficient handling of engines at a locomotive terminal he would probably answer, a good organization, up-to-date shop equipment, or something similar. It would never occur to him to say "an ample water supply," because the average roundhouse foreman considers his water supply as a matter of course. To the roundhouse foreman with a modern roundhouse, modernly equipped and with a well-organized staff, who from the mere fact that he is a roundhouse foreman and a railway man has troubles of his own, the following narrative of water troubles is specially directed, in the hope that some glimmer of it may remain in his memory and comfort him with the thought that it might be worse, when the superintendent and trainmaster are after him hot foot because he does not furnish power as quickly as they can switch out cabooses.

The scene of these experiences is a road located far enough west to be in the bad water belt and far enough north to encounter severe winter weather. Some years ago, in order to meet competition, an extension was decided upon. Owing to trouble in getting an ample water supply there was a delay in locating one of the division points, the result being that when the balance of the extension was ready for operation this terminal was incomplete. Pending completion locomotives were taken care of outside and turned on a Y. Neither the pipe line from the water supply—three miles away—nor the pump house were ready but it was hoped to have them complete before cold weather set in. In the meantime the nearest available water supply was 32 miles away. Twice a day the engines requiring water were coupled together and run as a train to this water tank and their tenders filled. Every engine required tube attention on arrival, owing to the bad water, and frequently they had to have prompt action from the boilermaker to prevent loss of water. Two trips were the most possible between washouts.

For washing-out a small duplex pump and a vertical boiler were used. The engine to be washed after returning from the water supply with a full tender of water had the suction pipe of the washout pump placed in the tender. The boiler washer had to conserve the tender of water, as may be imagined, since it had to serve for washing and refilling the boiler and running to the water tank for another tender full.

One night the washout pump, without warning, gave out. As there were two engines due for boiler washing the yard engine was pressed into service; one of the injector branch pipes was disconnected and the washout hose was connected to the injector in its place. The broken pump could never be made to work satisfactorily again, and whether the order for a new one was misplaced, or not placed at all, was never learned; but no other pump arrived, and the injector washout system did business through the autumn and winter. Although the roundhouse building was available shortly after winter set in, the main water supply pump, through some mistake or misunderstanding, did not arrive till February.

One of the first storms of the winter was very severe, and during this storm the third engine, in a train of six going for water, left the track about 10 miles from the water tank. The rear engine started back for the wrecking outfit with about one-third of a tank of water, and was stuck in a snow bank within half a mile. The engine crew and one brakeman shovelled an hour before they could get the engine through, and when they got the wrecker back to the derailed engine, the tender of their engine was dry and all hands had to shovel snow to get enough water to keep the engine alive. In the meantime the first two engines had cut off and gone on for water. They returned in about four hours, having been snow-stalled three times. Nothing had been done toward getting the derailed engine on the track, beyond putting in the replacers, as none of the remaining engines had sufficient water to do any hauling. Another three hours brought the whole train back to the terminal, with a total water supply considerably less than what the engines had at starting. Of the resulting train delays the less said the better. The two leading engines, having enough water to get them back to the tank, were started out at once with a plow to clear the division ahead of a passenger train, the rear one returning later and taking the other four for water.

Shortly after this a number of tank cars that had been used in construction work were refitted and provided with a piping arrangement for steam to keep them from freezing. One engine was assigned to handle this train between the tank and terminal as frequently as needed. As to a method of getting the water from the cars to the tenders, the "powers" did not seem to consider such a thing. An effort was made to revive the defunct pump, but it was only an aggravation. A request for an elevated track, on which to place the cars and permit of the water running to the tenders by gravity, was refused on the grounds that the main supply pump would be along in a few days and it would not be worth while going to the expense. After the whole staff had worn out their tempers fussing with the pump, an arrangement was made similar to a lifting injector on a crude scale. Into one end of a 4 in. pipe T was screwed a 4 in. to 1¼ in. bushing. A piece of 1¼ in. pipe, with one end flattened and reduced to form a nozzle, was screwed through this so that the nozzle end came about half way through the T. The 1¼ in. pipe was extended on the outside, and a hose connection was made to the turret of the engine to be watered. A 4 in. pipe was screwed to the bottom of the T, and this was placed in the car for suction.

To the other end of the T a 4 in. nipple was screwed, and a 4 in. discharge hose was connected to this and turned into the tender. By turning on the steam in the cab the water was drawn up through the suction pipe and forced through the discharge hose into the tenders. In this way a tender could be filled in about 35 minutes. This arrangement was used from that time to the end of the water troubles, and while in summer it would have worked fairly well, in winter it was the cause of many an engine delay. The steam hose would burst or blow off at the most unexpected and inopportune times. Then the steam entering the the cold pipe caused it to crack frequently, and there were many fingers frozen while putting in new pipe. On one occasion, after trying in every way possible to get water through the discharge hose, it was removed and found to contain a piece of an old coat.

The coaling plant was not as far advanced as the engine house, and was not ready for use till the following spring. Engines were coaled by hand, shovelling from gondola cars with a great deal of labor as the coal was generally frozen on top. It frequently required 2 or 2½ hours to coal an engine. Before the engine house was completed, boiler makers frequently had to go into the engines as soon as the fire could be dumped after their arrival to prevent their "dying" from leaky flues while waiting for coal; for the same reason when the roundhouse was completed they were frequently run in on arrival without waiting for coal. Occasionally an engine "died" on the turntable and the fire had to be dumped into the ash pan while the boilermaker went into the gas-filled firebox and stopped the worst of the leaks. The fires had then to be re-kindled to get steam to work the engine into the house.

On one of the coldest days of the winter, in a blinding snow-

storm, an engine arrived pushing a snow plow to which it was chained on account of a broken drawbar. The chain was a solid mass of ice. The left injector would not work, and the right feed hose had frozen solid, the engineer overlooking the heater in his anxious watch for signals. The water in the boiler was so low that it was impossible to get the frozen chain uncoupled and the engine into the house before the water would be below the safety mark. An effort was made to thaw the frozen hose, and while this was being done three men started removing the chain. In the meantime the water was getting so low that the fireman (who had been on duty for 36 hours and was also drenched to the skin and his outer clothes frozen) became excited and pulled the right heater wide open. The hose, with the sudden tendency to straighten out, pulled off at the tender and the two-thirds tank of water commenced making a lake around engine and plow. A rush was made for the tender water valve. It was stuck open. After ten minutes trying to get it closed it was given up, the fire was dumped, and another engine hurried from the roundhouse to pull the plow engine to a point where the water would run off the track instead of back on it. The chain had by this time been removed, but the ice formed so quickly that the relieving engine left the rails almost a car length from the plow engine. By the time it was rerailed, the plow and engine were in the center of a frozen lake, and there was nothing left but to drain everything about the engine and start a gang of men with picks removing the ice from the rails. It took three hours to get the engine and plow dug out.

On the completion of the engine house, the supplying of water to the heating system boilers became a problem. All of the openings in one of the engine pits were closed, and the boiler feed pump suction pipe disconnected from the main water line (in which, of course, there was no water) and extended to this pit. Tank cars were then run over this pit and drained into it. On one occasion, when the heating-fan engine broke down, the engine house became so cold that this pipe froze and cut off the water supply, and until the engine was repaired the pipe had to be kept thawed by lighting fires around it.

A shortage of power required the use elsewhere of the engine hauling the tank train, and thereafter the first available engine was used on this work. The cars could only be kept heated part of the time, and the result was that they soon became thickly coated with ice inside, thus cutting down their water capacity. Several times after this method was started engines that had just come in leaking had to be used, and engine failures on the trip for water caused bad delays. The men, from the foreman down, were frequently 24 and 36 hours without rest, and had worked not less than 17 hours a great number of the remaining days. The climax seemed to have been reached when the water began to get low in the well at the distant tank. Everything possible was done to conserve the supply—engines were given only what was required to move their trains to the next tank; time between washouts was lengthened as much as possible, and most of the washing out was handled at the other terminals. As a last resource the boiler feed pump suction pipe was removed from the pit and turned into the shop drain, and for two weeks the stationary boilers were run on the washout water from locomotives.

Fortunately, just as the water supply began to fail, the large pump arrived and was hurried across country to the pumping station. On the first day of March, water came through the main supply pipe, and the relief to the entire staff can be better imagined than described. The station being out of the way, it was hard to get men, and under such conditions it was still harder to keep them, the result being that the shop had been run with a depleted staff all winter.

There were two trainmasters coming in contact with this station. To the credit of one of them, be it said that during the entire time of these difficulties he raised no complaint regarding delayed trains. The other was an office man, who neither understood the conditions nor would come to be enlightened. Cabooses could be handled at that terminal as well as at any other, and he did not see why locomotives could not be handled in the same way. He reported every five minute delay, the only result being continual friction between his office and the foreman's.

These are some, but by no means all, of the incidents in what seemed afterwards to the staff to have been a long nightmare. Yet there are terminals today that are no better situated. It is hoped that this history may prove interesting, and as stated at the beginning, of some comfort to long-suffering roundhouse foremen.

SHOP KINKS.

BY F. W. BENTLEY, JR.,

Chicago & North Western Railway, Huron, S. D.

JIG FOR SCRAPING ROTARY VALVE SEATS.

A simple, inexpensive and handy jig to be used in scraping the rotary valve of a Westinghouse engineer's brake valve is shown in Fig. 1. The device is arranged so that the valve seat may be placed at any angle. Part I is held rigidly in a vise,

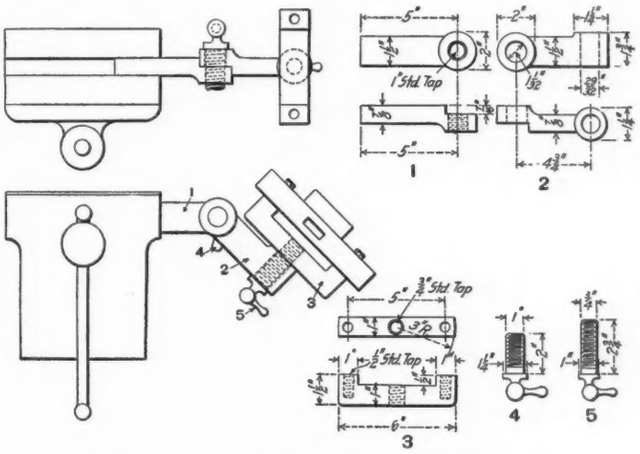


Fig. 1—Jig for Scraping Rotary Valve Seats.

the arm 2 being adjustable and held in its position by the thumb screw 4. The rotary valve is clamped to the forked piece 3, and is held to arm 2 by the thumb screw 5. With this arrangement the seat can be easily and quickly turned and adjusted so as to get the full benefit of the light, and the spotting of the high points is made much easier. Piece 1 may be permanently bent to any angle that will make the work more convenient for the workmen.

SAFETY DEVICE FOR COUPLERS.

A means of preventing two couplers from working apart is shown in Fig. 2. Two 1⅛-in. pins are placed in the holes in the knuckle lock and are tied together at both the top and bottom

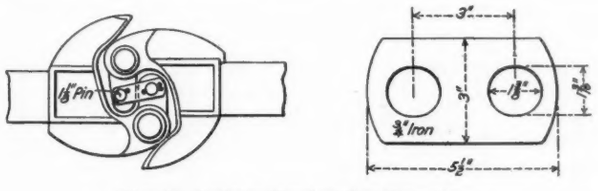


Fig. 2—Safety Device for Couplers.

by ¾-in. tie-plates as shown. The pins are prevented from working out by split pins, which are placed in both ends. With this arrangement the use of safety chains may be discontinued.

TRACK LOCK FOR TURNTABLES.

A convenient track lock for turntables is shown in Fig. 3. It can easily be made in any railway smith shop by taking a piece

of 4 in. x 7/8 in. bar iron about 4½ ft. long and welding on each end two cross pieces of the same stock about 15½ in. long so that the overall length of the assembled bar will be 4 ft. 9¾ in. This will readily slip in the tracks between the webs of

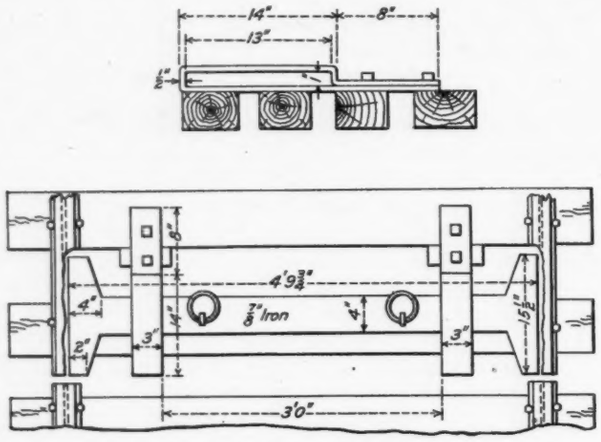


Fig. 3—Lock Bar for Turntables.

the rails. The lock bar is held in place by two straps made of 3 in. x ½ in. bar iron as shown. Rings are placed in a convenient position for the handling of the bar.

SYSTEMIZED CLERICAL WORK AT THE ENGINE HOUSE.

BY CHARLES MAIER,

Engine House Foreman, West Jersey & Seashore, Atlantic City, N. J.

There is one line of work in connection with the motive power department, and I do not know to what extent in other departments, to which scientific management can be applied with good results. During the past ten years the clerical work at engine houses has increased to such an extent that in some cases the clerical force has been increased more than 100 per cent. The average engine house foreman is not an office man, and as the demand arises for each new record to be kept the work is turned over to the clerical force. An examination of this clerical work will show a surprising amount of duplication, which if thoroughly investigated and eliminated will result in a considerable saving of time and labor. All the elements necessary to effect this elimination are not within the control of the engine house foreman, but since the work done is practically the same at all engine houses a systematic method of doing it is all that is required.

There are records for which printed forms or books are furnished and as they are the same at all points the manner of keeping them can be readily systematized. Since these forms are all alike it would appear at first glance that there can be only one way of filling them out. That this is not the case, however, can be shown by considering the time record of the workmen. Here is a record having a daily entry and a monthly total, and if all the men worked a regular number of hours each day at a given rate per hour it would be a very simple matter to get the total number of hours worked and the total amount earned. Where the hours are not regular throughout the month or the daily amount earned is not the same each day, as in piece work, it is a tedious piece of work to total it up for 100 or 200 men. An adding machine would help, but even this would take time, and time at the end of the month is precious to the clerical force on account of the various monthly reports required. If the time were made out in such a way that the number of hours made each day, or the amount earned each day, were added to that of the previous day, as it is entered on the sheets or books, the total at the end of the month or at any time during the month would be available at once. In order that the number of hours made, or amount earned daily, can be distinguished, two entries should be made for each day. Thus, the time made each day is put down in the regular way and immediately above it the total to date is placed. Thus if 237 hours had been made up to the 24th of the month and 9 hours were made on the 25th, the 9 hours would be entered and above it the total of 246 hours. This would apply to piece work or to any records where there is a daily entry and a weekly or monthly total. In the oil room or coal wharf records this is a very convenient method and shows at a glance just what the oil or coal consumption is to date for any given service.

Locomotive No. Assigned to_____Enginehouse.

REPORT OF STAYBOLTS TESTED AND BOILER WASHED.

Staybolts must be tested every seven days, and if found overdue must be tested at the point found overdue.

Loco. No.	Staybolts.				Boilers.			
	Date Due.	Date Tested.	Broken.	Renewed.	Date Due.	Date Washed.	Date Tested.	REMARKS.

Inspector. Foreman.

Fig. 1—Form for Reporting Staybolt Tests and Boilers Washed.

Let us consider the staybolt and boiler washout records and see how they are kept. As the staybolts are tested and the boilers are washed at regular intervals a list is made out showing when the engines are due. Where engines are regularly assigned to the care of an engine house it is not necessary to interchange this information and a record of only such engines as are assigned to the engine house is necessary. However, to overcome the chance of an engine being skipped it is now the custom to put a tag on it, showing the date the staybolts were tested or the boiler was washed. This tag is applied by the men inspecting the staybolts and is therefore a thoroughly reliable record. If an engine arrives at another engine house than that to which it is assigned and is found to be overdue for a staybolt test or a boiler washing, according to the dates given on the tags, or if the tags are missing, the fire is drawn, the work is done and a report is made of it, which eventually gets back to the party responsible, so there is not much danger of an oversight. When the staybolts are tested or the boiler is washed the staybolt inspector turns in a form showing the condition of the staybolts, the date they were inspected, and the date the boiler was washed. This is then entered in a book or on a sheet by the clerk and at the end of the month a new sheet is made out; all the engine numbers are written and if no printed blanks are available, a lot of ruling is made necessary and this same work is gone over again each month.

If we substituted in the place of the tags the form shown in Fig. 1, keeping it in a suitable frame in plain view, all the work of making out a list and checking it up could be overcome. These forms are to show the date the engine is due for a staybolt test or a boiler washing written on them by the staybolt inspector and are made in duplicate with carbon paper. The original is put in the frame on the engine, having the engine number and the place of inspection filled in together with the dates when the engine is due. The carbon copy is turned into the engine house foreman's office and is filed away according to the date. This gives the foreman a record of the engines due for this work. When the work has been done the staybolt inspector takes the original form off the engine, substituting a new one having the date of the next inspection thereon, and turns the original report into the office after signing it. This report is then disposed of, as usual, by sending it to the master mechanic or road foreman of engines. The duplicate copy is filed away according to engine number. If one of these reports were taken off the engine and the engine was at another engine house than that to which it was assigned, it would be its duty to attend to the work the same as though the engine were overdue. Thus by relying solely on these forms to give the dates due, the hostlers and staybolt inspectors must watch them continually, and the regularity of the test is thus insured. This method therefore gives a reliable record of the engines due for the staybolt test and boiler washing and also a record of the engines which have had this work done to them. The only work required is that which the staybolt inspector must now do when filling in his report, and all the clerical work in the office is dispensed with except the filing. Where an engine house takes care of 50 or 100 locomotives this is quite an item and well worth saving.

REPORT OF WORK DONE ON TUBES OF CLASS_____ ENGINE NO._____

DURING THE MONTH OF_____ 19____ AT_____

	NO. RENEWED.				NO. RESET.				NO. CAULKED.				REMARKS.
	A	B	C	D	A	B	C	D	A	B	C	D	

A	B
C	D

Foreman.

Fig. 2—Form for Reporting Work Done on Tubes.

There are usually a number of periodical inspections that are made on boiler washing days, such as examining water glass valves, examining sponging and shells, draining the main reservoir, etc., and this involves considerable more clerical work where records are kept of it. Sometimes this work is assigned to certain men and they are supposed to do it, but there is no record that it has actually been done. If these periodical inspections are all printed on a blank the men doing the work could sign opposite and these blanks could be filed away in numerical order, thus insuring a permanent record and no clerical work would be required except the filing. In filing these reports and also the work reports of engineers and inspectors they should be placed between cards, the cards bearing the engine number and arranged in numerical order. This is more desirable for these reports than a cabinet with shelves, because when they are filed away for several months and engines come to the engine house, aside from the regular assignment, or engines are sent to the shop and others come out, it is not so difficult to locate the desired report. It is absolutely necessary that an engine house office should have a good filing system so

that any records, blue prints or instructions can be readily located and referred to.

The record of crews arriving at and departing from the engine-house consumes considerable time and is a duplication of the list posted for the information of engine crews. For the information of engineers and firemen a list is posted at the engine house showing the train they are to go out on and the engine they are to have. This list is generally made out on a slate, or a sheet, and is copied into a book, or on another sheet, which is kept for a permanent record. If the list that was posted had been made out in duplicate one sheet could be filed away for a permanent record and arranged according to dates, while the others could be sent to the engine houses reached by engines leaving the point where the list is made out. By the interchange of these lists a permanent in and out record of engines is available and the only work required is the making out of the posted list and filing.

The flue record is another case of unnecessary work. The boilermaker turns in a report showing the work done, the dates of the examinations for the information of other engine houses. The men making the examinations, or the gang foreman having charge of them, turn in a report which is then entered on the office record. If each engine carried an engine record card, as shown in Fig. 3, and a duplicate card were kept in the office of the engine house charged with the care of the engine, a considerable saving of clerical work could be effected and all the information would be in a compact form. As the dates of the various examinations do not always coincide, the men charged with making these examinations could tell at a glance which ones were due. They could get the duplicate card from the office, entering the date of the examination on the card carried on the engine, and on the duplicate, making no more work for them than formerly, when they turned in a report to the office, while the office would have no clerical work to do except filing the card in its proper numerical order.

Another good feature of this engine record card is the accessibility of the information. A road foreman of engines

Locomotive No._____ Assigned to _____Engine House.

ENGINE RECORD CARD.

	Date.	Place.	Date.	Place.	Date.	Place.	Date.	Place.	REMARKS.
Class Repairs.									
Tires turned.									
Flues renewed.									
Triple valves cleaned.									
Steam gage tested.									
Piston valves exam.									
Boiler tested.									

Fig. 3—Form for Reporting Various Examinations and Tests of Parts of the Locomotive.

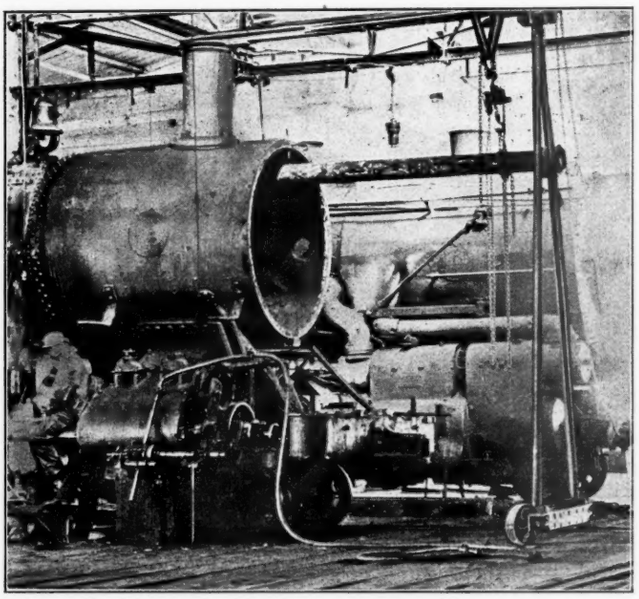
clerk copies this work in a book and then makes out another report to be sent to the master mechanic or road foreman. With a suitable flue report form, such as shown in Fig. 2, the boilermaker using carbon paper could make out the required number of forms for each engine and have no more work, or possibly not as much to do as at present in making out his reports. He could retain one form for his information, one to be kept at the engine house foreman's office and the other to be disposed of as required. These forms should be filed away according to engine numbers and will give all the information that is now being written and rewritten, two, three and four times, and it would be just as convenient and reliable a record as the present one.

There are other examinations, such as boiler tests, cleaning triple valves, testing steam gages, examining piston valves, bushings, etc. These are made at longer intervals and a record of them is kept at the engine house, while the various parts are marked in a suitable manner showing the or a master mechanic when looking over an engine frequently wants to know when the engine last received new flues, piston valves or bushings, or had driving boxes rebored, tires turned or when the engine was put in service after receiving classified repairs. If he has not a record of it at hand and happens to be at some place where no record is kept, he must do without it until he gets back to his office or can get the information over the phone. Cases of this kind arise when time is precious or when the office is closed, causing annoyance and delay. The engine record card would overcome this and at the same time eliminate the chance of these examinations not being made, due to an oversight on the part of the clerk in not furnishing the information. This card, being in plain view, will insure the examinations being followed more closely, as they can be checked up by the enginemen, road foremen of engines, master mechanic or any one interested who happens to get on the engine. This outline of a system of clerical work can be modified or extended to suit requirements.

CRANE FOR LOCOMOTIVE REPAIRS.

BY GEORGE D. SIEMANTEL,
General Foreman, Atchison, Topeka & Santa Fe, Raton, N. Mex.

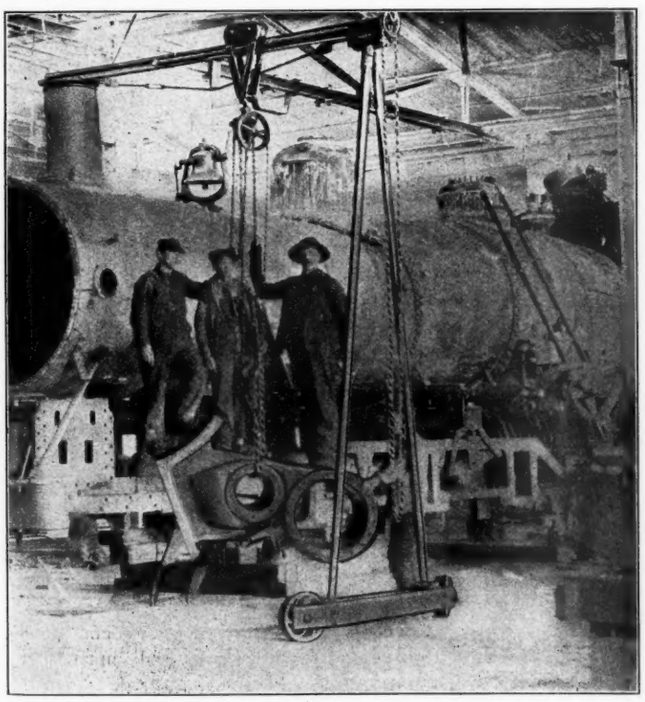
A handy crane for use when overhauling a locomotive is shown in the accompanying illustrations. It is pivoted on the smoke stack and will easily swing around to either side of the locomotive with or without a load. An old cast steel cylinder



Repair Crane for Locomotive Front End.

head that will fit freely in the stack supports one end of an old rail used for the cross beam, while the other end is supported by two legs of 2½ in. pipe. The legs fit into two round end hinges at the top, which in turn are bolted to an old tank wedge, fitted on the outer end of the rail. The top ends of the pipes are fitted with steel sleeves to prevent splitting.

The bottoms of the legs are held in a carriage made of



Repair Crane Loaded to 7,629 lbs.

scrapped car transoms, which are bolted together on blocks just inside of the wheels. The ends of these transoms, which hold the wheels, are bent to conform to the radius from the center of the stack. The blocks that hold the pipe legs are drilled 8 in. deep, which gives ample support to the legs, and are made to slide inside the carriage frame, thus allowing for a height adjustment, which is necessary, as the height of the stack above the floor will vary on different engines. The holes in the carriage blocks should be on a line between the centers of the two wheels, as this increases the stability.

The crossrail is reinforced by an inverted king-post truss and carries a two-wheel trolley, which is moved back and forth by means of a double threaded screw on the crossrail which is operated by a sprocket wheel and chain at the end of the beam. Care should be taken, when applying the crane, that the stack is strong and not eaten away, as such unevenness would be liable to capsize the crane. Its use is very valuable in shops where overhead or traveling cranes are not provided. Three men can usually put this crane on an engine in about 20 minutes, and it is said that the time saved by its use on one engine will almost pay for the crane.

WASHING LOCOMOTIVE BOILERS.*

The Chicago, Milwaukee & St. Paul use very thorough methods in washing out their locomotive boilers. The washout plugs are located in the front flue sheet for washing the flues. In the larger engines there are six plugs for this purpose, and in the smaller engines there are four. They are distributed in such a manner that each plug can be conveniently taken out with a long wrench, and are so located that six rows of flues may be washed from each plug hole. There are three washout plugs located in the boiler head so that all parts of the crown sheet may be washed; one plug is placed in the center over the door ring, another underneath the door ring, and one in each corner of the mud ring to wash the mud ring and the side sheets. Two are placed on each side of the outside sheets of the firebox and are so located that all parts of the side sheets may be washed. There are also two plugs in front of the throat sheets in line with a row of staybolts just above the fire line. Arch bar tubes are used to hold the brick arches, thus giving an additional number of plugs both on the boiler head and throat sheet. These are taken out at each washing and the tubes are cleaned with the Liberty arch tube cleaner. The larger engines have four and the smaller ones three of these tubes. A standard nozzle is used for all the engines, which allows a man standing on the platform at the front of the engine to place the nozzle through the washout plug in the front flue sheet and reach clear to the back flue sheet. This nozzle is fitted with a brass tip which throws the water at an angle of 60 deg. However, it was found necessary to drill a half-inch hole in the opposite side of the tip to balance it while in operation.

The washing is started as close as possible to the front flue sheet, and is gradually carried back to the back flue sheet. The nozzle is fitted with swivel and handle which allows it to revolve continually from one flue sheet to the other. The washing is repeated three times at each washout plug. Each time a nozzle is put into a washout plug hole it is held to the back flue sheet for one minute with the nozzle continually revolving. For the firebox a crown-sheet nozzle is used that will allow an engine to be washed the entire length of the crown-sheet through the washout plug holes in the boiler head. This nozzle has a brass tip set at right angles for the purpose of washing all the sludge into the leg of the boiler instead of washing it over on the flues. This nozzle is used in each hole on the crown-sheet. It is then replaced by a short straight nozzle with which all parts of the crown sheet are washed through each washout plug

*Committee report on this subject which was presented before the recent Convention of the Traveling Engineers' Association.

hole. This throws the water the entire length of the boiler over the top of the flues, removing all loose settlings from the flues. This again is replaced by a short crooked nozzle which washes over the door ring and crosswise and lengthwise through the mud-ring plugs. It is also used in the side plugs for washing the side-sheets. This nozzle removes all settlings from the flues and crown-sheets, off the mud ring and leg of boiler.

SHOP SAFEGUARDS.

BY LUTHER D. BURLINGAME.*

There have been two general reasons for putting safeguards on machinery. One has been to protect the machine from injury and the other has been to protect the workman. The protection of the machine has in the past been one of the great objects sought. For example, in grinding machinery the gearing and working mechanisms have been more thoroughly guarded than similar parts of other tools, for the purpose of protecting them from water and grit. The wheel guard, or hood, was originally provided rather to prevent the machine from slopping and throwing water and grit than to protect the workman. Latterly, however, pressure has been brought to bear through accident insurance companies, and employers' liability and compensation laws to make it more worth while financially for the manufacturer to guard the dangerous parts of machinery than to leave them unprotected. It is perhaps too much to expect that complete safeguarding will be adopted generally by manufacturers without compulsion, but such a course would be far preferable to a delay until compulsory legislation shall enforce such a procedure.

Safeguarding, furthermore, means expense to the manufacturer in two directions. There is first, the direct cost of installing guards, railings and other safety appliances; and second, the added cost of doing work where the workman is hampered by the safety provisions.

It is much better that the manufacturer of tools should provide the safeguards than that the user should have to design special guards for each make of machine that he happens to buy. Some investigation of the claim that safety devices retard production has made the writer feel that there is less in this argument than is often urged. Ingenuity, a time study, and special training with proper readjustment of piece work rates will often not only insure absolute safety, but even a higher rate of production than at present.

A classification of safeguarding devices to eliminate features of danger may be grouped into ten classes.

1. Guards for gears. All running gears within a workman's reach when standing on the floor should be guarded at least on the intaking side of the gears.

2. Railing or boxing for heavy and high-speed belts, and for pulleys which are near the floor. These guards may be either a complete enclosure within boxing, or by railing around them, or by a combination of railing and wire mesh. Even when the combination seems unreasonably safe, there is danger of accident from slipping or falling. An accident has often resulted in this latter case in the workman being caught between belt and pulley.

3. Projecting set screws. All revolving projecting set screws should be either guarded or replaced with a style which does not project. This projection is most important in places within reach of the workman, but is also present in overhead shafting where there are parts requiring oiling or adjustment.

4. Securing overhead parts against falling. Any overhead parts which may drop on a workman's head below should be so held as to make this impossible. Traveling cranes, for example, should have a cradle below them to catch any keys or gears which might work loose. Sufficient space should also be left between the pulleys themselves, and between hangers and pulleys so that a belt which runs off cannot become wedged and drag down the counter-shaft on workers below. Counter weights which may strike a workman in falling should be boxed, or incased in metal tubes. On overhead runways in foundries, which have switches, a safety guard should prevent the trolley with its load of melted metal being run into an open switch so that the metal can fall.

5. Safety stop for planers. All planers should be provided with a safety pin to lock the shipper lever so that it cannot be accidentally displaced.

6. Chains for hoists. Frequent inspection is the only safeguard here. Some experiments in annealing chain to remove the tendency to brittleness after service have not shown conclusively that this can be depended on as respects ordinary chains not exposed to heat.

7. Fingers and hands between dies and shears. The only safe rule is to forbid hand feeding and compel a mechanical feed, or the handling of the work with tweezers, pliers, etc.

8. Safety appliances for wood-working tools. Band saws can be fully guarded by a hinged guard covering the upper wheel, to catch the saw if it breaks, and a head guard following the saw down to a point near the work. A suction draught to carry away chips and sawdust is also desirable. These help also to keep the floor clear and less liable to become slippery. Padded leather aprons to be used with circular, slitting or ripping saws are a protection to the workman against the throwing of the block against him if it should catch in the saw.

9. Cleanliness, light and air. Adequate light not only keeps the workman in better condition for work, but more alert. Noxious fumes make him stupid and are a menace to health.

10. Education and instruction to prevent accident. Many accidents occur with new men just starting in. The foreman must exercise constant watchfulness over men showing a tendency to recklessness.

It is not claimed that these ten headings exhaust the list of avenues through which accidents occur, but if each shop were inspected, taking these items one at a time, a very large reduction in the number of accidents would follow. Classification and specific investigation followed by the adoption of thorough means of safeguarding, and maintained by periodic inspection to see that provisions which have been adopted remain in use is perhaps, after all, the most effective combination.

*Chief Draftsman, Brown & Sharpe Manufacturing Co., Providence, R. I. This paper was read at the National Metal Trades Association, April 12-13, 1911, in New York, and was reprinted in *The Journal of Industrial Safety* for June.

An interesting comparison between the oldest locomotive in the United States and one of the latest heavy passenger locomotives is made by the Pennsylvania Railroad, and shows the progress made since the first train was put into service eighty years ago. The old locomotive is the John Bull, which is on exhibition at the National Museum in Washington. The Pennsylvania locomotive is of the Pacific type, being the most powerful passenger locomotive used on that road. The weight of the locomotive and tender of the Pennsylvania engine, when loaded with coal and water, is about 430,000 lbs., as against 24,625 lbs. for the John Bull; the driving wheels are 80 in. in diameter, as against 54 in. The boiler of the modern locomotive contains 359 tubes 20.9 ft. long, having a heating surface of 4,420.6 sq. ft. The tubes in the John Bull are 7½ ft. long and have a heating surface of only 213 sq. ft.

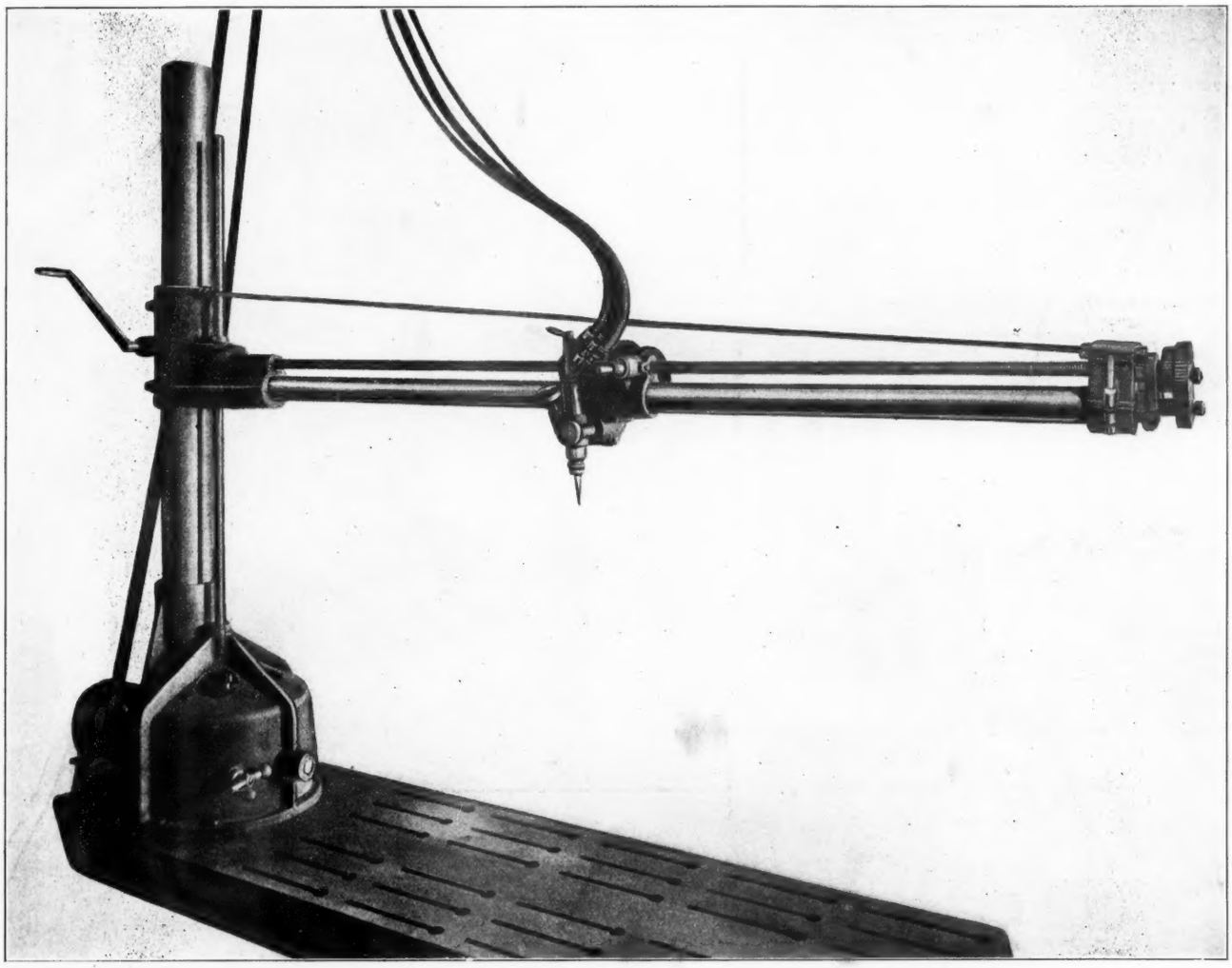
When the Atlantic type locomotive appeared in England some time ago it was not long in gaining popularity, as the design was looked upon as a solution of a difficulty that was supposed by many to be acute. As a matter of fact, however, this did not prove true, for had the Atlantic type offered a superior opportunity of utilizing the weight for adhesive purposes it would not have been replaced a little later by the 4-6-0 type, which has proved to be of greater advantage. When still more power is required the Pacific type is expected to take the place of these ten-wheel locomotives.

OXY-ACETYLENE WELDING AND CUTTING MACHINE.

Hand welding and hand cutting are now familiar operations to which the acetylene blow-pipe is highly adapted. Where straight-line operations have to be carried out, especially in connection with repetition work, a machine is often applicable and advisable, and where sheets are very thin, machine welding is desirable because of the certainty with which it can be regulated. Such a machine can be advantageously used in sheet metal work where the thicknesses range up to about 3/16 or 7/32 in. Straight cutting of both thin and thick work can be advantageously done with the machine, because of the precision of the movement.

An acetylene welding and cutting machine has recently been built by the Davis-Bournonville Company, New York, at its laboratory in Jersey City, N. J. It consists of a cylindrical upright 6 or 7 ft. in height. This carries a long hollow arm projecting for 6 or 7 ft. on one side. By means of a rack and pinion this arm, which carries a long screw, may be adjusted to any height desired. At the base of the upright loose and tight pulleys are mounted on a short horizontal shaft and are driven from an ordinary countershaft above. At one end of the short shaft a friction pinion is arranged, which contacts with a suitable disk mounted on a vertical shaft. This latter shaft and a rotatable rod arranged in the hollow arm are connected by bevel gears. At the outer end of the arm an arrangement of gears enables the inclosed rod to drive the screw. The turning of this screw operates a carriage back and forth horizontally along the arm. Upon the carriage are mounted the torch and its controlling fixtures. The work is placed or secured on a suitable fixed table, and flexible tubes bring the oxygen and acetylene to the torch. The tip is practically the ordinary form, and it is arranged at an angle of 40 deg. or 45 deg. to the horizontal, this angle being to the rear of the welding movement.

The method of welding is quite simple. If the weld is to be a flat one and of inconsiderable length, the two pieces are simply clamped in the exact relative positions they are to occupy finally. The carriage with the torch moves evenly along at the proper rate of speed. The countershaft, running at about 140 revolutions per minute, operates the short horizontal shaft at about 70 r. p. m. It is possible to adjust the friction pinion to vary the speed of the vertical shaft from about 70 to about 35 r. p. m.



Oxy-Acetylene Welding and Cutting Machine.

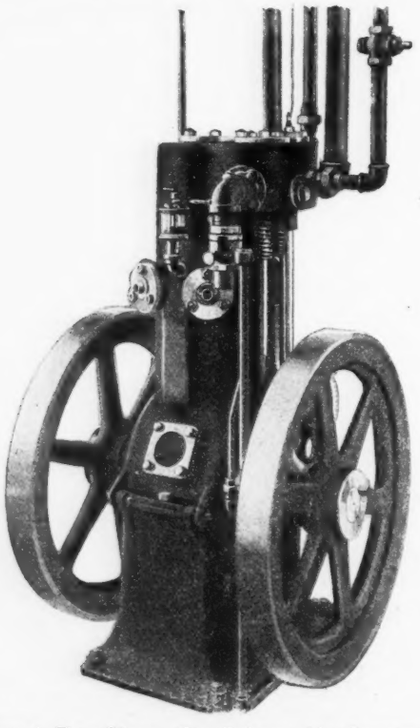
Still further reductions of speed may be made by the gears at the end of the arm. If an angular weld is to be formed, the only difference is in the arrangement of the work. The angle opens downwards and the vertical plane through the line of the weld bisects the dihedral angle. To illustrate, suppose that it is desired to weld two strips edge to edge at an angle of 90 deg. The strips are placed on the sides of an angle bar and clamped securely in position with clamping strips inserted between the outer faces of the work and the jaws of the clamps.

Because of the temperature of about 6,000 deg. F., which is claimed for the working point of the little inner flame, the oxy-acetylene torch is successful in bringing steel and other metals locally to or near the melting point, but where the form and character of the work do not prohibit there seems to be no

reason why pre-heating by cheap methods should not be employed. The saving is, in such cases as not alone connected with the consumption of the gases, but time may also be saved. For example, certain work requiring a long seam and involving sheets 0.10 in. to 0.12 in. thick can be welded on a European machine at the rate of about 12 in. per minute. Practical experiments where the work was pre-heated before passing under the torch showed that the same class of work could be welded at a speed of 26 in. to 28 in. per minute. The economy in time is striking. The methods of pre-heating may be various. Thus, if it is a question of small repetition work, the pre-heating may in some cases be done subsequent to clamping, but prior to putting the work on the table. Other cases will require pre-heating with the work in a welding position. Pre-heating is to be recommended strongly for two reasons—economy of oxygen consumption and reduction of the effects of expansion and contraction. The machine above described may also readily be used as a cutting apparatus, and the high precision of the motion of the carriage recommends it for this purpose.

TWO-STAGE, GAS-DRIVEN AIR COMPRESSOR.

A self-contained, efficient, gas driven air compressor is shown in the accompanying illustrations. It consists of a vertical gas engine with a differential trunk piston, the annular space around it being used for compressing the air. There is but one piston, one connecting rod and one crank shaft for both the gas engine and compressor, which increases the efficiency of the unit. On the up stroke the air is drawn into the crank case through the port *K*, when it registers with *J*, the corresponding

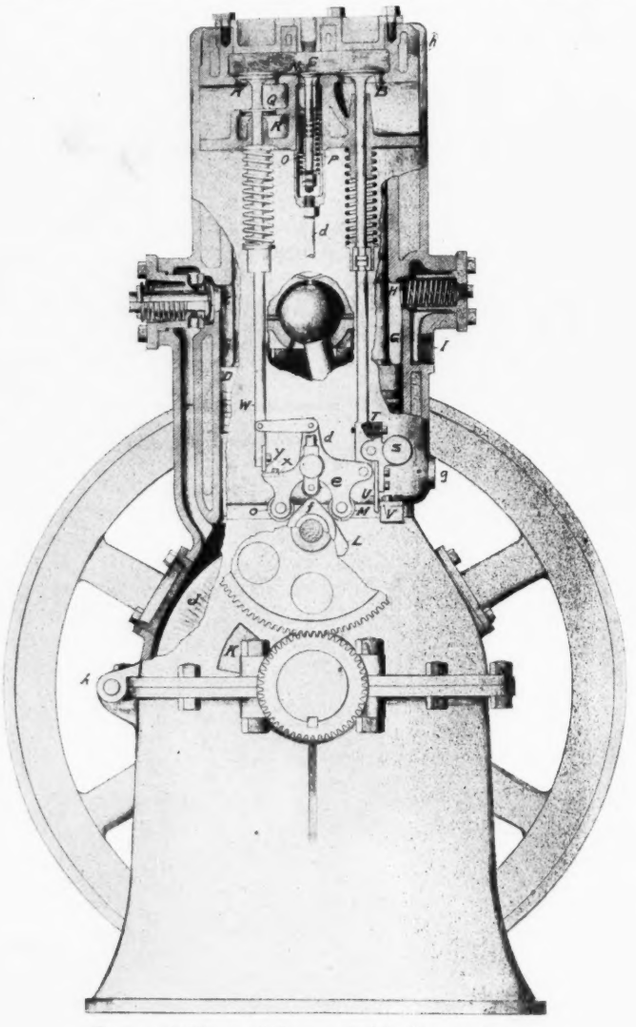


Sargent Two-Stage, Gas-Driven Air Compressor.

port on the crank disc. On the down stroke the air is compressed in the crank case and flows through the valve *E* into the annular chamber made by the differential piston. On the return stroke this air is forced through the discharge valve *H* and outlet *I* to the storage tank or receiver, during which time the crank case is again filled.

On account of the large surface surrounded by cold water and the short distance the heat has to travel when generated in the annular space by compression, the thermal efficiency should be higher than in compressors having a small cooling surface per unit of volume. As the pressure is always down, a clearance of .01 in. can be easily maintained, as well as discharge pressures of from 60 to 140 lbs. An absolute pressure of 21 lbs. is maintained in the crank case when compression begins in the second stage. The cold water surrounding the annular chamber in which the air is compressed and cooled passes up and around the combustion cylinder sufficiently warm to increase the efficiency therein. As the upper end of the connecting rod is a large steel ball, the piston and rings may revolve at will, giving a uniform wear to the cylinder.

The engine proper is of the four cycle type and as air is compressed every stroke the two flywheels and crank discs are made heavy to maintain a sufficiently uniform speed. An inertia gov-

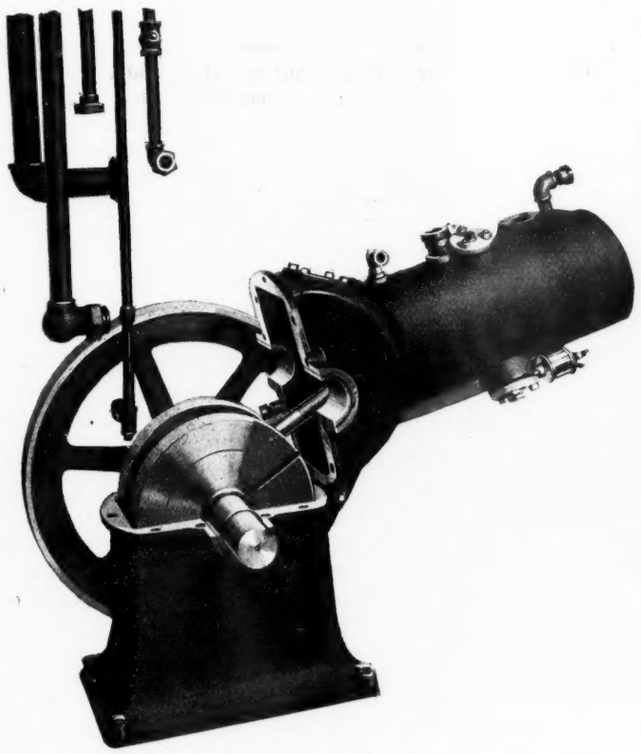


Exposed View of Sargent Air Compressor.

ernor *S*, falling slower than the spring seated exhaust valve *B*, when the engine tends to run above the normal speed, allows *U* to engage *V*, holding the exhaust valve open and the inlet valve stem *W* in such a position that *X* will miss *Y* and the inlet valve will remain closed. When the speed drops *U* will miss *V* and the engine will resume its normal speed. Either gas, gasoline or kerosene may be used for fuel. When gas is used it is admitted through a graduated valve to the space *R* from which it flows to the explosion chamber *C* with the air when the collar *Q* on the admission valve stem rises.

The compressed air used for starting the engine is taken from a storage tank through the valve *H*, positively opened at the beginning of each working stroke as long as the compressed air is turned on and the pressure is greater than in the explosion chamber. The crank pin is accessible through the

hand hole plates, or the piston rod and the crank may be adjusted or removed by turning back the cylinder on the hinge *k*. One sight feed oil cup lubricates both ends of the piston; the superfluous oil gathered by the narrow groove in the piston is delivered through diagonal holes to the ball and passing half way around, flows through a hole in the connecting rod to the crank pin. The main bearings are lubricated by heavy grease, which also makes an effectual air seal. Ignition is by jump



Sargent Air Compressor; Crank Case Exposed.

spark when the primary circuit is closed once in two revolutions by a pin on secondary gear. Compressors of this type will compress air to 200 lbs. gage, or to any lower pressure at which the unloader is set. One cam controls both admission and exhaust, and the valve motion is quiet and positive. The compressors are made in four sizes to compress from 9 to 150 cu. ft. of free air per minute. They were designed by C. E. Sargent, 136 West Lake street, Chicago.

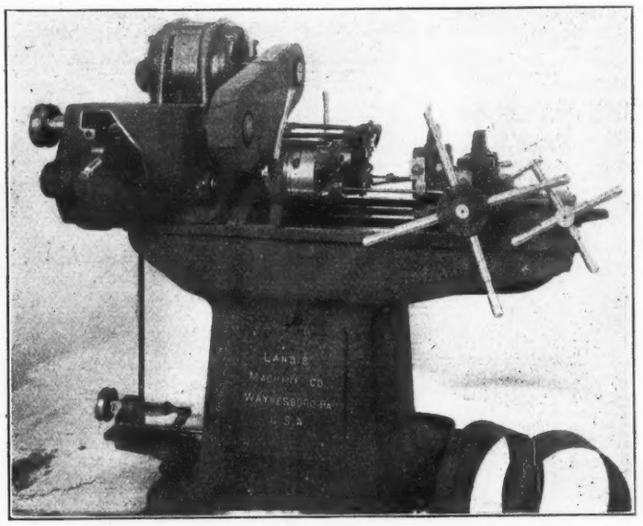
FOREIGN RAILWAY NOTES.

The Guatemala Railway has contracted with the government to build a railway from Zacapa to the frontier of Salvador. This line will be extended, under a concession from the government of Salvador, to Santa Ana in that republic, where it will join the Salvador Railway.

The Pacific Railway, Colombia, which, starting from Buenaventura on the west coast, runs to the city of Cali and thence through the Cauca valley, is expected to be in operation to Cali by the latter part of 1911. Cali was also connected with the Cauca river in July, 1910, by a short steam tramway. The Pacific line is expected to follow the valley of the Cauca for a considerable distance, and will furnish an outlet to the sea for the increasing commerce of that fertile district. With the completion of this line and the railway connecting the Cauca river with the cities of Amaga and Medellin, also that between Medellin and Puerto Berrio on the Magdalena river, the transportation rates on coffee will undoubtedly be cheapened and the products of a large part of the republic will be much more easily and quickly transported to foreign markets than at present.

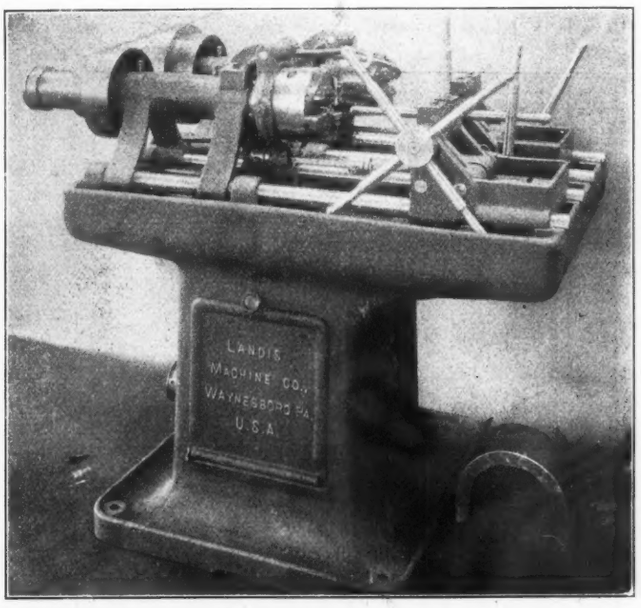
BOLT CUTTING AND THREADING MACHINES.

Several new types of threading machines have recently been brought out by the Landis Machine Company, Waynesboro, Pa. They possess many unique and distinct features as compared to the machines it has been building. In the 1½ in. double head bolt cutting machine, shown in the accompanying illustration steel guides are used instead of cast iron guides, as has been the common practice in the past. Among the advantages possessed by the steel guides are the fact that they are accurate to size and maintain alinement at all times unless affected by



Landis 1-in. Double Head Bolt Threading Machine.

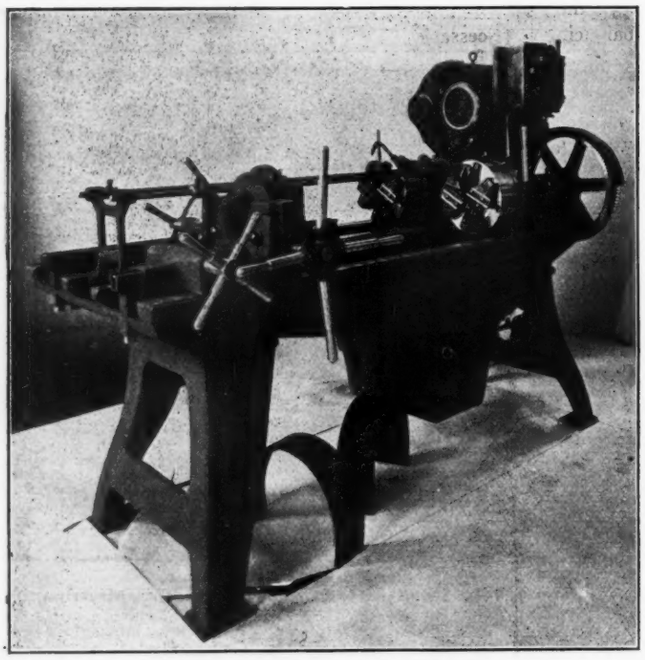
wear after long usage; that when the guides become worn they can readily be replaced at a slight expense, whereas on a machine with cast iron guides the wear that may occur cannot as a rule be compensated for, especially if the wear is not regular on all parts of the guide; that there is no tendency for cuttings to collect on the guides and cause them to wear, as with flat guides. The machine is built with a wide body, and has a large space for chips. The oil tank is placed in the base, and is separated from the chip room by a fine screen. The carriage is light, yet strong, and easily operated for rapid production. The oil pump is on the rear of the ma-



Landis 1½-in. Double Head Bolt Cutting Machine.

chine, and is of the rotary type. The machine is made for high speed work and is furnished almost exclusively with high speed steel dies.

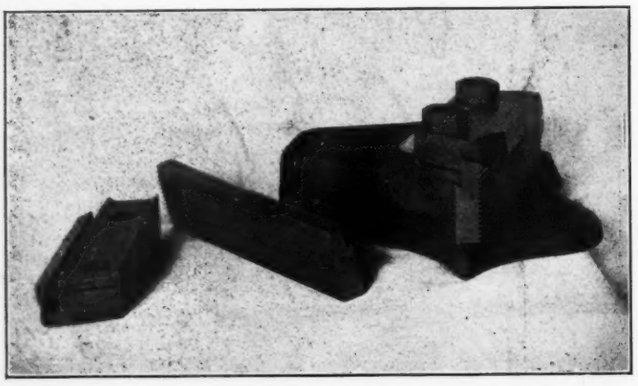
The standard 1 in. double head bolt threading machine, as shown, is provided with a constant speed motor, a silent chain drive, a mechanical speed change device, and a speed range of 3¼ to 1. The motor is mounted on top of the machine out of the way of dirt and oil, making the entire equipment compact and occupying a minimum amount of room. Speed changes



Landis 1½-in. Double Head Staybolt Cutter.

can be made while the machine is in operation, and any speed between the maximum and minimum can be obtained in an instant. The machine is also adapted for high speed work. The carriages have adjustment up and down, or sidewise, for centering the die, and the machine may be furnished with either rack and pinion operated carriages, or with lever operated carriages.

The 1½-in. motor driven double head staybolt cutter is equipped with a variable speed motor, having a speed variation of 4 to 1, which provides a wide range of speeds, thus making



Threading Die Showing Chaser and Holder.

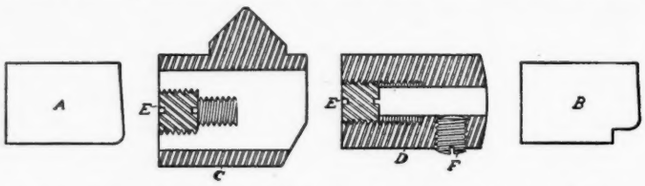
it possible to use either carbon or high speed steel dies, as the case may require. The motor is mounted on top of the machine, and is direct connected to it. This machine will be furnished with lead screw attachments for one or both heads, as may be desired, and will be arranged to cut any pitch and diameter within the range of the machine by changing the gearing, no extra lead screw being required. The main spindles of all the machines are provided with recesses to allow the lubricant to return to the oil tank. The Landis type of die is used, and is held in different ways to suit the different requirements.

The chasers in the Landis die are held by means of a clamp which comes flush with the front edge of the die, so as to admit of cutting close to the shoulders or the heads of the bolts at any time. Dies with very short throats or with no throats at all can be used, and as no grinding is done in the throat of the die when sharpening the throat remains permanent, which gives a marked advantage on many classes of work. The holder is shown herewith with the mill type of clamp. This clamp is used especially for threading pipe as the clamp comes over the chaser in such a manner as to protect it when the pipe splits or catches the chaser. The die holders are made entirely of steel, as are also the die heads on all Landis machines. Any of these machines can be arranged for constant or variable speed motors as the case may require.

MICROMETER BORING TOOL.

A boring tool which makes the roughing and finishing cuts in one operation, and also has a micrometer adjustment, is shown in the accompanying illustrations. It is called the Twentieth Century boring tool, and is made by the Wellman Company, Medford, Mass. Four cutting tools are used, and they are so arranged that but ¼ in. additional feed over the length of the hole to be bored is required for the finishing cut. This tool is of special advantage in boring wheels for axle fits. By the micrometer adjustment the cutters may be set in or out accurately within .001 in. In the detail illustration, the cutters are shown at *A* and *B*. *C* is a vertical section of one of the cutter carriers, and *D* is a horizontal section. These carriers, as shown at *C* have a projection on the top, the faces of which make an angle of 45 degs. with the top of the carrier.

The outer, or right hand, surface of this projection bears on a corresponding beveled surface on the under side of the microm-



Cutters and Cutter Carrier for Micrometer Boring Tool.

eter ring. The inner surface bears on a beveled surface in a sliding bar. There are four of these bars, one for each tool, and they are held in longitudinal slots in the tool body under the micrometer ring. This part of the body is not threaded, and the micrometer ring is free to slide up or down. However, these sliding bars extend beyond the tool body and are threaded to fit the inside of the micrometer ring. By turning this ring they will be raised or lowered, as desired. When they are raised the beveled surface is lifted from the corresponding surface on the cutter carriers, and when the micrometer ring is pressed down, it being loose on the body of the tool holder, the tools are forced inward by the beveled surface on the inside of the ring until they again bear on the beveled surfaces of the sliding bars. When the micrometer ring is turned the other way the sliding bars are lowered, causing them to bear on the inside of the projection of the tool carrier, which forces the tool out.

The upper ring or set collar is threaded to the tool body and when the tools are once adjusted, it is screwed down against the micrometer ring and holds it in place. The threads on the sliding bars have a pitch of .125 in. There are 125 micrometer graduations, so that the movement of the ring by one graduation means the moving of the tool carrier .001 in. The tool is held in the carriers by screws *E* and *F*, *E* being the adusting screw

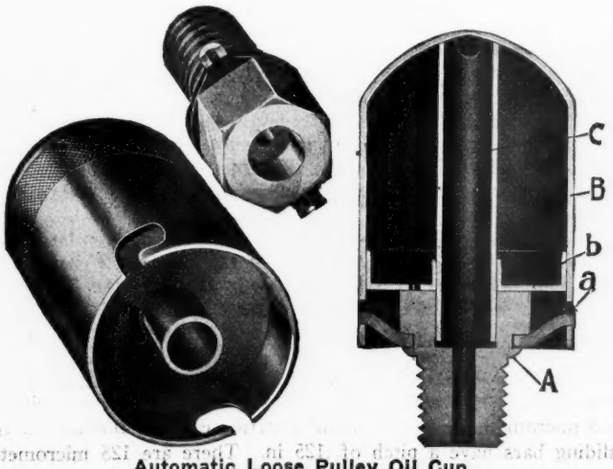
and *F* the locking set screw. The cutters may be ground to any length, but when located in the cutter holders must be equidistant from the centre. The tool *A* shows the approximate shape of the tools and *B* shows the way in which the finishing

Micrometer Boring Tool.

tool is cut to follow the tool *A*. When adjusted for finishing, this tool is allowed to project about 1/16 in. beyond *A*. A record of 2 min. 28 sec. for roughing and finishing two 750 lb. car wheels, with 7¼ in. hubs, has been made with these tools.

LOOSE PULLEY AUTOMATIC OIL CUP.

A loose pulley automatic oil cup, which is made by the American Specialty Company, Chicago, is shown in the accompanying illustrations. The oil is contained in the pressed steel shell

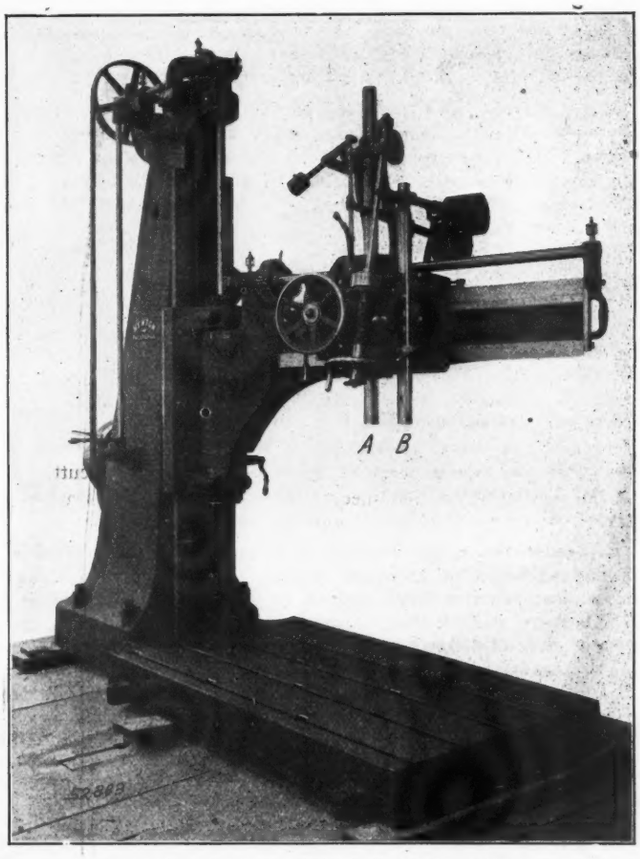


Automatic Loose Pulley Oil Cup.

B, and as the pulley revolves the oil is thrown to the top of the cup and is forced into the feeding tube *C*, which serves as a measuring tube. When the pulley stops the oil will work down from *C* into the bearing. To fill the cup, simply remove the shell *B* from *A*, which is screwed in the oil hole of the pulley, and pour the oil in through the hole shown in the bottom *b*; then replace the springs *a* which securely hold the cup to the nipple *A*. The supply of oil will last from one to three weeks, according to the number of starts and stops made by the pulley. Its value will be appreciated when it is considered that the chance of spattering oil over the floor, workmen, machines and belts is greatly reduced. The illustrations shown are full size, and the total weight of the cup is so small that no counterbalancing is necessary.

RADIAL DRILL AND TAPPING MACHINE.

A combination drill and tapping machine made by the Newton Machine Tool Works, Philadelphia, Pa., is shown in the accompanying illustration. The drill is held in spindle *A*, and the tap in spindle *B*, which revolves at a reduction of speed in the ratio of 2¼ to 1 from the speed of the spindle *A*. After the hole is drilled one revolution of the hand-wheel places the spindle *B* over it. The drive to the tapping spindle is arranged for reversing, the clutch controlling this operation being operated by a lever. The machine is belt driven, having a step pulley of four diameters, which with back gears, with a ratio of 2 to 1, provide eight different speeds. There are also four



Radial Drilling and Tapping Machine.

rates of feed to the spindle, which is provided with an adjustable automatic release. The spindle is counterweighted and may be operated by a hand-wheel which gives a rapid adjustment. The saddle arm has a square lock bearing on the upright and is operated by power; it may be raised or lowered rapidly. The trunions are mounted in roller cage bearings. The diameter of the spindle is 2 13/16 in., and the distance from the center of the trunion to the center of spindle *A* is 64 in. A length of feed of 17 in. is provided and the maximum distance from the base to the center of the spindle is 81 in.

General News Section.

At Meridian, Miss., indictments have been found against the New Orleans & Northeastern for falsification of records and bills of lading.

In the federal court at Buffalo, N. Y., September 27, fines aggregating $1,000 were imposed on the New York Central for violation of the law limiting the length of time which animals may be kept in cars.

Southbound train 29, of the Missouri, Kansas & Texas, was stopped by three masked men near Okesa, Okla., last Tuesday night, and the robbers rifled the mail and baggage cars, but got little of value. They did not enter the passenger cars.

The Alaska Steamship Company has bought large quantities of crude oil for fuel, and it is said that oil fuel is to be used on the locomotives of the Copper River & Northwestern and also in the power plants of many gold mines in Alaska.

The Southern Pacific, and the Corvallis & Eastern have filed suits in the Federal Court at Portland, Ore., against the enforcement of the 14-hour labor law of Oregon, enacted by the last state legislature. The companies hold that the law is in direct conflict with the 16-hour federal law.

Ture Tulien, a machinist apprentice on the Atchison, Topeka & Santa Fe, at Topeka, Kan., has been awarded the Santa Fe-Armour scholarship, which is maintained by the *Santa Fe Employees' Magazine* at the Armour Institute of Technology in Chicago. It provides for four years' free tuition to the boy having the best record for his four years' apprenticeship.

W. A. Garrett, who, as noted in the *Railway Age Gazette* of September 29, page 614, has resigned his position as vice-president of the T. H. Symington Company, has been elected chairman of the General Managers' Association of Chicago, and also of the Association of Western Railways. Mr. Garrett assumed his new position on October 2. His office is at 605 Western Union Building, Chicago. The former chairman of the General Managers' Association was W. J. Jackson, vice-president of the Evansville & Terre Haute and the Chicago & Eastern Illinois.

The University of Illinois opened its academic year 1911-12 on Wednesday, September 20. The registration of students in the College of Engineering during the first two days was 1,135. The new members of the faculty include C. R. Richards, formerly dean of the College of Engineering at the University of Nebraska, appointed professor of mechanical engineering in charge of the department; A. M. Buck, formerly professor of electrical engineering at the Clarkson School of Technology, appointed assistant professor railway electrical engineering.

Cromwell Dixon, 19 years old, flying in a Curtiss biplane, at an exhibition in Montana August 1, flew over the Rocky mountains, starting from Helena at 2:08 p. m., and arriving at Blossburg at 2:34. On his return to Helena he was presented with a purse of $10,000. A few days later Dixon was killed.

The postmaster-general has given a special order authorizing E. L. Ovington, an aviator, to carry United States mails. Mr. Ovington proposes to fly from New York to the Pacific coast. The order establishes special mail messenger route No. 607001.

The firemen of the Georgia & Florida Railroad struck and left their work on September 28, and press despatches of October 1 reported all traffic on the road suspended. There was considerable violence by mobs; and a trestle 350 ft. long, three miles north of Douglas, was destroyed by fire. On Monday, October 2, press despatches reported that a state of anarchy prevailed along the line of the road, two passenger trains having been captured on Sunday by armed mobs. The strikers include both white men and negroes, and the citizens along the line are said to sympathize with them. On Thursday morning an officer telegraphs that the railway company is making steady progress in filling the places of strikers, and that the company expects to resume full freight and passenger service soon.

George A. Burns, the oldest track-walker in point of service on the Pennsylvania Railroad, has just put his 177,900th mile behind him. He has walked the equivalent of 7⅓ times around the world in the last 35 years, journeying four times a day between Greensburg, Pa., and Youngwood yard, a distance of 3½ miles. Other Pennsylvania track watchmen who have distance records are William Young of Franklyn, Pa., with 154,144 miles in 22 years and 8 months; Dennis Watters, Norristown, Pa., with 111,624 miles in 24 years; Simon Owens, Washington, D. C., with 135,626 miles in 25 years and 4 months; and Julius Hein of Edgewood, Md., who has covered 101,100 miles in 23 years and 3 months. These five men together have walked nearly a million miles. The track inspectors on the Pennsylvania carry registering clocks. A patrolman registers in the tower at the end of his beat the hour and minute of his arrival; departs on his journey and registers similarly in the tower at the other end. His route usually covers about four miles, but is less than half this on stretches where special watchfulness is needed.

Disastrous Flood at Austin, Pa.

The town of Austin, Pa., on the Keating Summit branch of the Buffalo & Susquehanna was almost completely wiped out, on Saturday last, by a flood, caused by the failure of the dam of the Bayless Pulp & Paper Company, about 100 persons being killed. The damage to the property of the railway company is given by press despatches as amounting to many thousand dollars.

Who Was Dulce Glober?

"Dulce Glober" is a pseudonym which appears on the title page of a book of 224 pages entitled "Reminiscences in the Life of a Locomotive Engineer," which was published at Columbus, by Foster & Co., in 1861. A correspondent wishes to know the real name of the author. The book was re-issued in 1863 by J. Bradburn, New York City.

Mountain Type Locomotives.

Under the head of *Ratios* in the article on Mountain Type Locomotives for Heavy Passenger Service, published in the *Railway Age Gazette* of September 22, page 555, the last four ratios were given incorrectly. They should read as follows:

Volume of both cylinders, cu. ft.	21.40
Total heating surface ÷ vol. cylinders	193
Total equivalent heating surface ÷ vol. cylinders	252
Grate area ÷ vol. cylinders	3.12

Utopian Dreams of Travel.

Those persons who irk at the crude comfort of the Pullman and the parlor car will be pleased to learn of the new Train de Luxe which the Santa Fe is planning to put on between Chicago and Los Angeles.

This train will make travel such a dream of luxury that only the most blase traveler will be forced to look out of the window for amusement. It will have compartments, drawing rooms, parlors, bath rooms and barber shop, a lady's maid, a valet, a club car with a ticker in it, baseball and football bulletins, a library and pianola, observation balconies, a cigar counter, a wine cellar, a full assortment of millionaires to provide local color and other attractions which are bound to make it a great success.

Nevertheless we still believe that train designers lack imagination and ingenuity in their work. While the Santa Fe train will no doubt be a wonder and well worth the $25 extra fare which will be charged on it, think what would happen to it if some rival road should provide beside these attractions the following inducements:

A thermostat in each berth.

A moving picture machine which will provide plenty of scenery while the train is standing on side tracks [or passing through the dreary stretches of desert which the passenger agent forgot to mention].

A nursery for babies.

A special car for passengers who sleep with their mufflers cut out.

A full set of car window derricks.

A dining car that doesn't use the same kind of pie for dessert clear across the continent.

A democratic and approachable Pullman conductor.

A freight department which will not stand its freight trains against the choicest scenery whenever possible.

A rope with which to hang the observation platform hog.

Pullman seats in assorted sizes.

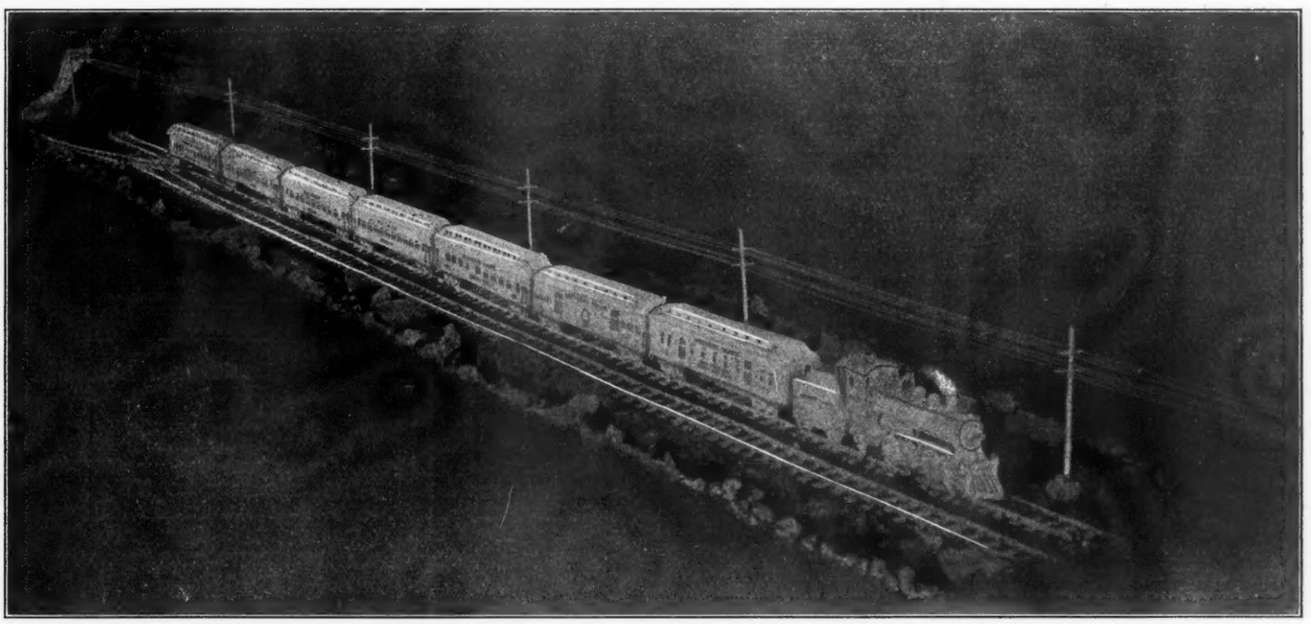
A newsboy who only comes when you press a button.

A transcontinental ticket neatly wound up on a hose reel which can be clamped to the car seat where the conductor can browse over it at his leisure.

We don't claim that all of these innovations can be procured at once successfully, but suppose the passenger department of some road should begin work along these lines. What chance would its competitors stand?—George Fitch in the *Peoria (Ill.) Transcript.*

A Train Made of Candy.

The Northern Pacific has produced the sweetest train ever made. It was one of the most interesting objects on the special train which the Northern Pacific ran from St. Paul to Duluth on the night of September 21 for the American Association of General Passenger and Ticket Agents. It was a reproduction of the Northern Pacific's crack train, the North Coast Limited, and was made of 80 pounds of sugar. It was made in the road's own bake shop by its chief pastry cook, and extended the full length of one side of the observation compartment of the buffet-observation car. The miniature train is illustrated herewith, and the illustration shows how faithfully all the details of the train, after which it was patterned, were reproduced. It was lighted by real electric lights and had an electric headlight glowing brightly. The track also was made of sugar.



A Train Made of Candy.

A New Idea in Promotion.

During the last four years the officers of your company have had a number of serious conditions to contend with—panics, crop failures, the Mexican insurrection, radical legislation, increased wages, increased cost of materials—all retarding the work of construction and making it cost more than was estimated; yet the line has been finished across Oklahoma and 340 miles completed in Texas, three disconnected sections joined. We now have 600 miles of continuous track in the states, and arrangements made for extension to Alpine, Tex., which will make 740 miles of line in the United States. Arrangements are also under way to build to a connection with the line east of Chihuahua, which will give us nearly 1,000 miles of continuous line, or, with the mountain and Pacific coast sections, 1,150 miles in the system. While results are not what we expected, under the conditions above referred to, they are remarkable.

Recently I have become interested in a telephone invention which is now, after 17 years of experiment, destined, I believe, to be adopted in the near future in every part of the world. This telephone holding came to me from the fact that I furnished the money to exploit it. If this invention works as well in actual service as in experimental tests, distant points can be connected at less than one-half the cost of any system in use. Talking tests have been made over the Illinois Central telegraph line from Chicago to New Orleans, 930 miles, and on an artificial circuit of 6,200 miles the voice was heard perfectly.

My interest in this invention I have decided to share with the railway stockholders, in order to reward their patience during the trying periods in the history of the company. The interest to be given them is: First, a 49 per cent. interest in the company that will own and exploit the device in England and the British possessions, except Canada; second, a 49 per cent. interest in the company or companies that will own and exploit the patents in France and its possessions, Germany, Spain, Portugal, Norway and Sweden. This will be represented by stock issues in each company of $2,499,000 of the common stock. The above interests will be transferred to the United States & Mexican Trust Company as trustee, the earnings on it to be used under conditions mentioned in a trust deed, first to make up any deficit in interest on the bonds of the railway company; second, to make up any deficit on the 4 per cent. dividends on the preferred stock, and the remainder for increasing dividends on the common stock of the railway.

I believe that the road will be rapidly finished, and that by the end of next year it will be connected with the track east of Chihuahua, and that when the earnings will justify the investment, and that the dividends from this telephone stock will so augment the annual dividends from the railway that the combined returns will be far greater than was expected originally.

This gift does not obligate the railway company in any manner, and I ask in return no financial compensation; but I do ask the hearty co-operation of all the stockholders in helping to finish this great transcontinental railway.

—From a circular sent out by *A. E. Stilwell* to stockholders of the Kansas City Mexico & Orient.

Railway Postal Regulations.

A conference was held in Washington on September 27 between committees representing the post office department and the railways regarding uniform specifications for postal cars. The fol-

lowing committee was organized by the Special Committee on Relations of Railway Operation to Legislation to represent the railways: R. B. Kendig, general mechanical engineer, New York Central; A. W. Gibbs, chief mechanical engineer, Pennsylvania; C. A. Seley, mechanical engineer, Rock Island Lines; R. E. Smith, general superintendent motive power, Atlantic Coast Line; A. Stewart, general superintendent motive power, Southern Railway; H. E. Mack, assistant traffic manager, Missouri Pacific; W. W. Safford, general mail and express agent, Seaboard Air Line. The following committee was appointed to represent the post office department: C. M. Reed, superintendent of railway mail service, Cincinnati, Ohio; G. D. Johnston, chief clerk, railway mail service, Chicago; C. H. Otis, chief clerk, railway mail service, St. Paul, Minn. These committees will work up uniform specifications for steel postal cars and wooden postal cars and specification for uniform interior arrangements of both steel and wooden cars. The committee will meet in Washington on November 1.

Old-Time Railroading in Missouri.*

BY J. K. MERRIFIELD,
Conductor Eastern Division, Missouri Pacific.

In March, 1870, I went from Great Bend, Pa., where I was conductor of a coal train on the D. L. & W., to Sedalia, Mo., to visit my sister. I was introduced to M. G. Cary, superintendent. I had been drawing $45 as conductor of a coal train on the D. L. & W, but soon got $85 as conductor of a freight train on the M. P., and lost no time when I laid off for sickness. This was quite a raise in salary. We had many disadvantages in those early days getting over the road with a train. The sidings were in most cases the house track, and cars were always standing on them. You would head in or back in as the case might be and couple up the cars; and that was no small job. In those days we never had links and pins enough, and the old wrought-iron open-mouth draw head was always robbed of pins and links by every crew that set a car out, so that of the three men we had on freight trains in those days, one was always busy carrying links and pins from the caboose to make the coupling. We had no air and "broke" by hand. Of course, we did not have the trains we have nowadays, as 15 to 20 cars was a loaded train no matter if the cars only contained one box each. If you had a waybill it was a load. Our engines were light; so were the cars. All freight trains were locals. The yard men at Jefferson City and Holden would put the cars on any train that was going out, whether the train was local or supposed to be a through train. We would arrive at a station any time of night, and if we had local freight to unload, we would pile it up on the platform and put the waybills through a hole in the door. We never checked freight out or in. No freight was ever stolen. No seals or locks were ever used on cars and many times I have unloaded a car to take it on to another station, where I needed a car; cars were a scarce article.

Railway men in those days enjoyed the work. It was no hardship to them, as we were all accustomed to hard work. There was no sixteen-hour law and no growling because we were long hours on the road. We got over the road doing all the work and overtime was not thought of. It all went in on the $85 per month for the conductor and $60 per month for the brakeman.

One day there was a call in the west for empty stock cars. I was called to go out on an extra with the cars. Andy Cope, at present one of our passenger engineers, was called to go with me. We left Jefferson City at 5:00 p. m. We got to Elston where we took coal. We carried the coal to the engine in boxes with handles at both ends. One man filled the boxes from a platform built high, even with the tender, and two men carried them, walking across on planks. It generally took from 40 minutes to an hour to coal up at Elston. When we got ready to go, we could not start the train and doubled to Centretown. We came back with our engine after the rear end, put it on a siding at Elston, returned to Scott, where there was a water tank, got a tank full of water, went back up to Elston, took on more coal, got rear end of train, went to Centretown, got my train together, and took siding for No. 3 and No. 4. After they passed, I started—just six hours after I left Jefferson City, 15 miles away. We doubled Johnson Hill, 2½ miles west of Centretown to McGirks, doubled Otterville, where in those days all trains expected to double. Doubled Muddy Hill, three miles west of Sedalia to Dresden, doubled Knobnoster, doubled Warrensburg and Centreview, arriving in Holden (107 miles) at 9:00 p. m., next day; just 29 hours after we left Jefferson City.

*From *Missouri Pacific Agents' Bulletin.*

Strike of Shopmen on the Harriman Lines and the Illinois Central.

Pursuant to instructions issued by the heads of their unions, a large number of the shop employees of the Harriman Lines and the Illinois Central, belonging to the federations of shopmen on these lines, went out on strike on September 30 at 10 o'clock a. m. On the Harriman Lines the strike followed a demand made by J. W. Kline, president of the International Brotherhood of Blacksmiths and Helpers, that Julius Kruttschnitt, director of maintenance and operation of these lines, should further confer with the officers of the federation, and the refusal by Mr. Kruttschnitt to do so. Mr. Kruttschnitt, in his reply to the labor leaders said:

"If the essentials of admittedly fair and considerate treatment, the payment of the highest wages of any railways in the territories served by our lines and the guaranty of hospital and generous pension benefits have not been sufficient to deter our shopmen from terminating agreements insuring those conditions, made from time to time in conference with their labor unions, and from spending four or five months in devising new issues and means to destroy existing harmonious relations, and, moreover, are not sufficient to induce them to remain in our employ and to make them realize their duty to the public, I do not see that we can do anything more to convince them that they have no good reason to stop work, or to prevent your giving approval and permission to them to leave our service."

The payrolls of the Harriman Lines show that at the time the strike was called they had in their employ about 7,000 men belonging to the unions which compose the federation on their lines, that is, the blacksmiths', machinists', boiler makers', car men's and sheet metal workers' organizations. It is stated by officers of the roads that about 50 per cent. of these employees, or approximately 3,500 went out. A few men who were employed in the shops, but did not belong to the federated crafts also struck. The officers of the Harriman Lines expressed surprise and gratification at the smallness of the number of their employees who went out. They say that the number was smaller than they expected; that they are having no difficulty in getting as many employees as they desire to take the places of those who have quit, and that if present conditions continue the strike need not interfere with their service within eight or ten months. The "strike breakers" who thus far have been employed are all good machinists and are able to do at once the work for which they have been employed.

The situation on the Illinois Central is less favorable than on the Harriman Lines. The total mechanical force of the Illinois Central at the time the strike was called is estimated at 12,500 men, including clerks, common laborers and ashpit men. As has been stated, only five of the crafts employed in the shops of the Harriman Lines are included in the federation whose officers ordered a strike. On the other hand, nine of the crafts employed in the shops of the Illinois Central are included in the federation on its lines—the blacksmiths, machinists, boiler makers, car men, sheet metal workers, steamfitters, painters, federal labor union, and (south of the Ohio river) the freight clerks. It is estimated that of the total number of men in the shops all but 4,283 left the service of the company. At the Burnside shops where 2,980 men were employed only 800 stayed at work; at Memphis where 1,059 were employed only 333 stayed at work; at Water Valley (Miss.) out of 576 men only 263 stayed at work; at Vicksburg out of 524 men 394 stayed at work, and at New Orleans of 642 men one-half stayed at work.

The situation on the Illinois Central is complicated by the fact that the clerks in its freight offices south of the Ohio river are among the strikers. One act of vandalism which they committed was to take with them when they left the offices at New Orleans a large number of waybills and other records whose removal disabled the company from making proper deliveries of freight. The result was more or less of a congestion of traffic and the issuance by the company of an embargo against all freight (except perishable) from connecting lines moving to

Memphis and New Orleans. The freight clerks north of the river did not strike. The company has sent 450 men south of the river to take the places of the strikers.

On the Illinois Central, as on the Harriman Lines proper, business generally is moving much the same as before, and the officers express confidence in their ability to fully cope with the situation. At Memphis, at New Orleans and at Jackson, Miss., the federal courts have issued injunctions restraining the strikers from all interference with the company's property or with the transaction of its business, and at New Orleans, where the order was violated, the court sent three men to jail and indicated that unless its orders were obeyed it would send some of them to the penitentiary. The Burnside shops at Chicago are being guarded by large numbers of police, and while numerous strike breakers have been put to work there, but little trouble has been experienced.

At McComb City, Miss., on Tuesday of this week, following a clash between strikers and strike breakers, the entire Third regiment of the Mississippi National Guard was ordered out to prevent further disorder and to protect the property of the railway. In the fight ten men were injured, one of them fatally. Strikers wrecked three coaches occupied by strike breakers. The Illinois Central on Tuesday secured injunctions from the Federal courts at Chicago and Cairo covering towns throughout southern Illinois, restraining strikers from interfering with men at work.

At Houston, Tex., on Tuesday a special officer, was killed just inside the gates of the Southern Pacific shop yards while taking officers and strike breakers from a train to the yard.

On Wednesday, Major George Hoskins, in command of the troops at McComb City, Miss., fearing mob violence, and at the instance of a large number of citizens, escorted 150 strike breakers, brought into the town, to the railway station and sent them by special train to New Orleans. By Wednesday there was a full regiment of troops at McComb, and 17 deputy marshals have been stationed there to enforce the federal injunction secured by the railway company. According to the press reports, the sending of the strike breakers out of town was carried out in spite of the protests of the Illinois Central officers. Early Wednesday morning there was a bomb exploded on the railway track not far from McComb, but the extent of the damage is not reported.

No trouble was reported on Wednesday from any point on the Harriman Lines, but, according to the Thursday morning papers, the offer of the Harriman Lines to take back strikers up to noon Wednesday, and the decision that after that time the company would refuse to re-employ strikers, did not result in the return of very many employees.

Chicago Great Western's School for Railway Men.

The Chicago Great Western is conducting a railway school at Oelwein, Iowa, for the purpose of instructing young men in order to fit them for positions in railway work. Hiram J. Slifer, general manager of the road, is taking a personal interest in the project and invites the young men along the line to write to him for particulars if interested in taking up the work. It is the opinion of the officers that it is better for them to take a hand in the training of the men than to depend on recruits with no railway knowledge. During the past year 37 graduates were placed in position on the Chicago Great Western in various capacities. The lecture course, which is the most interesting and practical feature, will be on a more elaborate scale the coming year than it was last year, the dates, subjects and names of officers delivering them being as follows:

November 3.—Transportation. H. J. Slifer, general manager.
November 9.—The Station Agent E. R. Beem, station supervisor.
—Physical and Technical Examinations. W. F. Perdue, instructor and examiner.
November 15.—Telepraph and Telephone. G. O. Perkins, superintendent, telepraph.
—Relation of Agents to Trainmasters and Despatchers. S. R. Bunch, trainmaster and chief despatcher.
November 22.—Station Accounting. W. J. Purdy, station auditor.
November 29.—Freight Traffic—First Principles. F. S. Hollands, assistant general freight agent.
November 29.—Passenger Traffic—First Principles. A. C. Irons, assistant general passenger agent.
December 6.—An Agent's Ambition. C. E. Carson, superintendent north division.
—The Baggage End of It. E. R. Reynolds, general baggage agent.
December 15.—Freight Accounting. H. Ernest, auditor freight receipts.
—Passenger Accounting. J. F. Wade, auditor passenger receipts.
December 20.—Solicitation of Passenger and Freight Traffic. G. A. Smith, department of freight and passenger agent.
—As an Agent Sees It. W. J. Fowler, agent Allison.

1912.

January 4.—Solicitation of Passenger Traffic. Geo. Bristow, division passenger agent.
—Solicitation of Freight Traffic. H. B. Holbert, division freight agent.
January 6.—Demurrage and Storage. M. C. Shields, manager north demurrage bureau.
January 11.—Personal Injury—Preventives and Care of Injured. Dr. A. M. Pond, company surgeon.
—Loss, Damages and Personal Injury Claim. G. B. Winston, legal department.
January 18.—Engineering.—L. C. Fritch, chief engineer.
—Motive Power. J. R. Thompson, master mechanic Western division.
January 25.—Freight Claims. J. H. Howard, freight claim agent.
January 31.—Transportation Facilities. F. Kinsey, inspector transportation.
—Car Service. G. A. Brown, superintendent car service.
February 7.—Relation of Agents to Superintendents. W. B. Causey, superintendent Southern division.
—Mechanical Engineering. F. W. Stubbs, mechanical engineer.
February 14.—Relation of Agents to Superintendents. T. A. Sweeney, assistant superintendent Eastern division.
—Railway Signaling. Jos Beaumont, signal engineer.
February 21.—Solicitation of Passenger Traffic. C. J. Brooks, division passenger agent.
—Solicitation of Freight Traffic. L. M. Foss, division freight agent.
February 28.—Relation of Agents to Superintendents. F. R. Blunt, superintendent Western division.
—Relation of Agents to Executive Department. J. H. Ambruster, chairman Education Committee.
March 8.—Economical Use of Supplies. H. E. Rouse, general storekeeper.
—Relation of Agents to Trainmasters. I. E. Palmer, trainmaster.
March 13.—Terminal and Junction Operation. P. B. Vermillion, superintendent Oelwein terminals.
—Handling and Loading Merchandise. S. V. Rowland, inspector merchandise handling.
March 20.—Solicitation of Freight Traffic. B. J. DeGroodt, division freight agent.
—Solicitation of Passenger Traffic. E. J. Sawyer, division passenger agent.
March 27.—The Successful Agent. G. O. Somers, general freight agent.
—Railroading as a Profession. A. L. Craig, general passenger agent.
April 3.—The Treasury Department. J. F. Coykendall, secretary and treasurer.
—Disbursment Accounting. W. J. Cunningham, auditor disbursements.

Waverly Transfer.

The freight transfer station of the Pennsylvania Railroad at Waverly, near Newark, N. J., employs a clerical force of 210, and a warehouse force of 249. The number of cars of freight transferred last year was over 100,000 and the result of the con-

solidation done here was a saving of 11,352 cars to the company, and much time to thousands of shippers. Into this station cars are fed from thirteen transportation companies, two terminal companies, and the docks of New York City; and also freight originating in Jersey City and Newark. During rush seasons as many as 700 cars are taken care of in a day. The transfer platforms at Waverly afford standing room for 212 cars. Cars are despatched directly to 121 different points daily.

The clerical work is heavy. Besides the waybills, of which 3,500 are sometimes made in a day by a force of 52 clerks, there is the accounting to be done. Settlements must be made with fifteen outside companies. There are eight departments: a Pennsylvania Railroad accounting department, a Union Line accounting department, separate departments for east and west bound waybills and car records, a tracing department and a transfer record department.

The Waverly Transfer was opened in September, 1904. At first it was planned to handle only the freight from the New York, New Haven & Hartford and the Long Island Railroads. Its capacity was 96 cars. After six weeks it became necessary to employ day and night shifts to keep up with the business. The station was soon enlarged to accommodate 200 cars and later its capacity was increased to 212. The tonnage of less than carload lots has increased nearly twofold from 1905 to 1910. The number of inbound and outbound cars has grown in like proportion. The difference between the number of inbound and the number of outbound cars represents the saving made by handling the freight in solid car lots. This difference amounted to 10,872 cars in 1905 and 11,352 in 1910. The greater economy in the matter of car mileage which is being generally practiced by the railways is indicated by the increase in average load per car received at the transfer, this was increased from 5.67 tons in 1905 to 6.33 tons in 1910. The outgoing cars carried an average load of 6.44 tons in 1905 and 7.42 tons in 1910.

American Association of Railroad Superintendents.

The action taken by the superintendents' association of the central states looking to the reorganization of the association was briefly noticed in the *Railway Age Gazette* of September 22, page 567. The by-laws of the new association show that regular meetings are to be held on the third Friday of March and of September each year. Superintendents, assistant superintendents and trainmasters are eligible to membership. Officers of industrial roads are not eligible. Any officer of a railway whose superintendent, assistant superintendent or trainmaster is a member, will be welcome at the sessions of the association and to take part in discussions. Each member of the association is entitled to one vote. Votes cannot be cast by proxy.

The association is organized on the same plan as that of the American Railway Engineering Association. A paragraph in the articles of organization speaks of members as "representing" railways, though it does not appear that this has any official meaning; in other words, the association is a body of individual men. The essential change made by the reorganization is the complete severance of all connection between the general association and the divisional associations in the 12 cities which have hitherto made up most of the membership of the larger body. At the same time it is expected that matters which are of sufficient importance will be reported by the local bodies to the larger association, and that the larger association will report its conclusions to the American Railway Association when that course may seem desirable.

The following are the officers and committees of the association for the current year, which ends with September, 1912:

President, E. H. De Groot, Jr. (C. & E. I.); first vice-president, Chas. Burlingame (Wiggins Ferry); second vice-president, H. R. Saunders (C., R. I. & P.). Executive committee (in addition to foregoing), J. A. Somerville (Mo. Pac.); T. B. Fogg (Toledo Term.); J. J. Coakley (Term. R. R. St. L.); Brent Arnold (L. & N.).

Committee on Transportation: John Fitzgerald (L. & N.); J. C. Hagerty (B. & O. S. W.); C. L. Gardner (T. & O. C.); C. L. Brevoort (C. H. & D.); J. J. Corcoran (C. H. & D.); L. E. McCabe (I. C.); T. H. Hayden (K. & I. T.).

Committee on Interchange Car Inspection: M. Marea (St. L. T. & E.); J. J. O'Brien (T. R. R. A. of St. L.); H. Boutet, chief interchange inspector, Cincinnati; J. E. Mechling (Vandalia); B. B. Greer (C., B. & Q.); D. E. Schaff (C., C., C. & St. L.); J. C. Sullivan (Wabash).

Committee on Train Rules: B. F. Hoehn (C. M. & St. P.); R. W. Edwards (K. C. Sou.); J. A. Cook (Wabash); J. M. Walsh (St. L. & S. F.); W. R. Hensley (L. H. & St. L.); also appointed by Train Despatchers' Association; J. E. Scott (G. C. & S. F.); R. C. Norton (H. V.); Benj. Breitegan (N. Y. N. H. & H.); E. A. Howard (C. & A.).

Secretary-treasurer, W. C. Cooder, Carew building, Cincinnati.

American Electric Railway Association.

The American Electric Railway Association has issued convention bulletin No. 4, giving a complete program of the convention to be held at Atlantic City, N. J., October 9-13. The meetings of the American Association will be held October 10-12. On Tuesday, October 10, there will be committee reports, an address on the Hudson & Manhattan Tunnels, by William G. McAdoo, president of the Hudson & Manhattan; and an address on The Effect of Railway Operation on Taxable City Property, by George H. Harries, second vice-president of the Washington Railway & Electric Company. Among the addresses on Wednesday, October 11, there will be one on Measures for the Welfare of Employees, by D. P. Pierce. On October 12 there will be committee reports and an address on Physical Valuation, by O. T. Crosby, president of the Wilmington & Philadelphia Traction Company. The meetings of the Accountants' Association will be held October 9-12. The meetings of the Engineering Association will be held October 9-13. On Monday, October 9, there will be, among others, a report of the committee on Education of Engineering Apprentices. On Tuesday, October 10, there will be the report of the committee on Heavy Electric Traction and of the joint committee on Block Signals for Electric Railways. On Thursday, October 12, there will be the report of the committee on Buildings and Structures and of the commimttee on Way Matters. On Friday, October 13, among the comimttee reports there will be the one of the committee on Equipment and the one of the committee on Standards. The meetings of the Claim Agents' Association will be held October 9-11. On Tuesday, October 10, there will be papers on getting Intelligent Accident Reports from Trainmen and also on The Prevention of Accidents. On Wednesday, October 11, there will be papers on The Education of the Public in the Prevention of Accidents. The meetings of the Transportation and Traffic Association will be held October 9-12.

International Association for Testing Materials.

The sixth congress of this association is to be held in New York City in September, 1912. The congress will meet in the Engineering Societies building, 29 West Thirty-ninth street, on September 3, and it is expected that the business will occupy about five days, and that thereafter the members will spend about a week visiting some of the principal cities of the country. Bulletins will be issued from time to time giving information concerning the congress. Suggestions are solicited from members of the American Society for Testing Materials and the International Association, also others who are interested, and will participate in the congress. All communications should be addressed to H. F. J. Porter, secretary of the organizing committee, 1 Madison avenue, New York City.

American Society of Civil Engineers.

At the meeting of the American Society of Civil Engineers, held October 4, a paper by Wilson Sherman Kinnear, M. Am. Soc. C. E., entitled The Detroit River Tunnel, was presented for discussion. This paper was printed in the *Proceedings* for August, 1911.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

Air Brake Association.—F. M. Nellis, 53 State St., Boston, Mass.
American Association of Demurrage Officers.—A. G. Thomason, Scranton, Pa.
American Association of General Passenger and Ticket Agents.—C. M. Burt, Boston, Mass.
American Association of Freight Agents.—R. O. Wells, East St. Louis, Ill.
American Association of Railroad Superintendents.—O. G. Fetter, Carew building, Cincinnati, Ohio; 3d Friday of March and September.
American Electric Railway Association.—H. C. Donecker, 29 W. 39th St., New York; October 9-13, 1911; Atlantic City, N. J.

AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 75 Church St., New York; November 15, 1911, Chicago.
AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—C. A. Lichty, C. & N. W., Chicago; Oct. 17-19, 1911, St. Louis, Mo.
AMERICAN RAILWAY ENGINEERING ASSOCIATION.—E. H. Fritch, Monadnock Block, Chicago; annual convention, March 19-21, 1912, Chicago.
AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION.—J. W. Taylor, Old Colony building, Chicago.
AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—O. T. Harroun, Bloomington, Ill.
AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.
AMERICAN SOCIETY OF CIVIL ENGINEERS.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.
AMERICAN SOCIETY OF ENGINEERING CONTRACTORS.—D. J. Haner, 13 Park Row, New York; 3d Tuesday of each month, New York.
AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York.
ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS.—C. G. Phillips, 143 Dearborn St., Chicago; annual, June 26, 1912, Quebec, Que.
ASSOCIATION OF RAILWAY CLAIM AGENTS.—J. R. McSherry, C. & E. I., Chicago; annual convention, May 22, 1912, Los Angeles, Cal.
ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago; annual, November 6-10, Chicago.
ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, 135 Adams St., Chicago; annual, June 24, 1912, New York.
ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conard, 75 Church St., New York; December 12-13, Louisville, Ky.
CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and Aug., Montreal.
CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.
CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.
CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.
CIVIL ENGINEERS' SOCIETY OF ST. PAUL.—D. F. Jurgensen, 116 Winter St., St. Paul, Minn.; 2d Monday, except June, July and Aug., St. Paul.
ENGINEERS' SOCIETY OF PENNSYLVANIA.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.
ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.
FREIGHT CLAIM ASSOCIATION.—Warren P. Taylor, Richmond, Va.; annual Buffalo, N. Y.
GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.
INTERNATIONAL RAILWAY CONGRESS.—Executive Committee, rue de Louvain, 11 Brussels; 1915, Berlin.
INTERNATIONAL RAILWAY FUEL ASSOCIATION.—D. B. Sebastian, La Salle St. Station, Chicago.
INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—L. H. Bryan, D. & I. R. Ry., Two Harbors, Minn.
INTERNATIONAL RAILROAD MASTER BLACKSMITHS' ASSOCIATION.—A. L. Woodworth, Lima, Ohio.
IOWA RAILWAY CLUB.—W. B. Harrison, Union Station, Des Moines, Ia.; 2d Friday in month, except July and August, Des Moines.
MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 95 Liberty St., New York.
MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, Old Colony building, Chicago.
MASTER CAR AND LOCOMOTIVE PAINTERS' ASSOCIATION, OF UNITED STATES AND CANADA.—A. P. Dane, B. & M., Reading, Mass.
NEW ENGLAND RAILROAD CLUB.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.
NEW YORK RAILROAD CLUB.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.
NORTHERN RAILWAY CLUB.—C. L. Kennedy, C., M. & St. P., Duluth, Minn; 4th Saturday, Duluth.
OMAHA RAILWAY CLUB.—H. H. Maulick, Barker Block, Omaha, Neb.; second Wednesday.
RAILROAD CLUB OF KANSAS CITY.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.
RAILWAY CLUB OF PITTSBURGH.—C. W. Alleman, P. & L. E., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.
RAILWAY INDUSTRIAL ASSOCIATION.—G. L. Stewart, St. L. S. W. Ry., St. Louis, Mo.; annual, May 12, 1912, Kansas City, Mo.
RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, Bethlehem, Pa.; annual, Oct. 10, Colorado Springs, Colo.
RAILWAY STOREKEEPERS' ASSOCIATION.—J. P. Murphy, Box C, Collinwood, Ohio.
RICHMOND RAILROAD CLUB.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.
ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—L. C. Ryan, C. & N. W. Sterling; September 10, 1912, Buffalo, N. Y.
ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.
SOCIETY OF RAILWAY FINANCIAL OFFICERS.—C. Nyquist, La Salle St. Station, Chicago.
SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.; annual, October 20, Atlanta, Ga.
SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.
TOLEDO TRANSPORTATION CLUB.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.
TRAFFIC CLUB OF CHICAGO.—Guy S. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.
TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.
TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Erie, Pittsburgh, Pa.; meetings monthly, Pittsburgh.
TRAIN DESPATCHERS' ASSOCIATION OF AMERICA.—J. F. Mackie, 7042 Stewart Ave., Chicago; annual, June 18, 1912, Louisville, Ky.
TRANSPORTATION CLUB OF BUFFALO.—J. M. Sells, Buffalo; first Saturday after first Wednesday.
TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.
TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y.
WESTERN CANADA RAILWAY CLUB.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.
WESTERN RAILWAY CLUB.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.
WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, 1735 Monadnock Block, Chicago; 1st Wednesday in month, except July and August, Chicago.
WOOD PRESERVERS' ASSOCIATION.—F. J. Angier, B. & O., Baltimore, Md.; annual, January 16-18, Chicago.

Traffic News.

The Nashville, Chattanooga & St. Louis is to run a "good roads train" over its lines for about a month beginning October 9.

The Pennsylvania Railroad announces a reduction from 67 cents per 100 lbs. (first class) to 58 cents, in the freight rate from Altoona, Pa., to Chicago.

The night trains of the Canadian Pacific between Toronto and Montreal now have a compartment sleeping car, each way, each night, in addition to the standard sleepers.

A Mexican correspondent calls our attention to the fact that the fares on the Southern Pacific in Mexico, a reduction in which was recently announced in these columns, are computed in Mexican currency; that is to say, the standard rate for distances not greater than 250 kilometers, which is eight cents, is equal to four cents in United States currency.

The Southern Railway Company, which for years has advertised extensively the virtues of the southeastern states as farming territory, as well as the advantages of those states for general industries, has made plans for greatly enlarging its advertising during the coming year, and has assigned one man to give this work his undivided attention. Advertisements will be published in 150 newspapers in the northern, eastern and western states and in Europe.

Shipments of cotton by vessel from Savannah, Ga., September 30 amounted to 95,756 bales, said to be a greater quantity than was ever before shipped out of any port in one day. The last ship sailed just before midnight to make good contracts which called for September sailings. The value of the combined shipments is estimated at $5,250,000. The cotton went out on eleven ships, nine to foreign ports and two to ports in the United States. Great Britain is the destination of 34,340 bales, France 10,500 bales, the Continent 46,800, and 4,372 bales are destined for points in the United States. The figure for the Continent includes 1,100 bales which will go to Bombay, India.

Several express companies operating in Illinois, including the Wells-Fargo, American, National, United States, Adams, Western and Southern, have appealed to the circuit court of Sangamon county at Springfield, from the orders of the railway commission of that state making reductions in express rates. By an agreement between the chairman of the commission and representatives of the express companies the reduced rates went into effect on October 3, the commission agreeing that this should be done without prejudice to the express companies in contesting the decision of the commission. In the appeal filed by Wells-Fargo & Company it is contended that the order of the commission was made and the tariffs adopted without giving the company an opportunity to be heard and to present evidence; that the rates made are confiscatory, and that they interfere with interstate commerce by giving intrastate commerce in Illinois an advantage.

The Interstate Commerce Commission has received tariffs, filed to go into effect November 1 and November 15, making important increases in class freight rates from eastern cities to the Pacific coast. At present the basis of rates is $3 per 100 lbs. (first class) from all points east of the Missouri river; but under the new tariffs, the rate from the Atlantic seaboard will be 40 cents (first class) higher than from the Missouri river. Increases are also made in certain commodities; while in certain other commodities reductions are announced. The class changes are summarized as follows:

Group A, consisting of Delaware, District of Columbia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, all of New York except a portion near Buffalo, all of Pennsylvania excepting the Pittsburgh territory, Rhode Island, Vermont, Virginia and West Virginia (north of the Norfolk & Western), the increase is from $3 per 100 lbs. to $3.70 (first class).

Group B, consisting of points in the Buffalo-Pittsburgh district, from $3 to $3.60.

Group C, consisting of territory between Buffalo-Pittsburgh group and Indiana and Illinois State line and west of the Mobile & Ohio from Cairo south to Mobile, and territory east of the Mississippi river, increase of from $3 to $3.50.

Group D—so-called Chicago-Milwaukee territory—increase from $3 to $3.40.

Group E, consisting of territory west of the Mississippi river and east of the Missouri, increase from $3 to $3.30.

Total Revenues and Expenses.

Logan G. McPherson, director of the Bureau of Railway Economics in presenting bulletin number 19, giving a summary of revenues and expenses of steam roads in the United States for the month of June, 1911, says:

"The railways whose reports are included in this bulletin cover 230,219 miles, or 94 per cent. of all the railway mileage in the United States. The total operating revenues for the month of June, 1911, amounted to $224,491,904. This includes revenues from passenger and freight traffic and from all less important sources, such as mail, express, and the like. Compared with June, 1910, these total operating revenues show a decrease of 4 per cent., amounting to $5,929,731, equivalent to $41 per mile.

"Operating expenses amounted to $153,878,087. This was $1,829,261 less than for June, 1910, the decrease per mile being $18 or 2.6 per cent. The only operating expense account showing an increase was the general expense account, in which are included salaries and expenses for general offices, legal and insurance expenses, and the cost of maintaining pension and relief systems for employees. In maintenance of way and structures, there was a decrease compared with June, 1910, of 5.4 per cent. The cost of conducting transportation decreased 2.3 per cent.

"Net operating revenue shows a decrease as compared with June, 1910, of $4,100,470, $23 per mile. This is equivalent to 6.9 per cent., a rate of decrease which would have been greater had maintenance expenses been normally sustained. The net revenue for each mile of track for each day of June was $10.22, for May $9.58. It should be recalled that net revenue is gross profits, before anything has been taken out for taxes, rentals, interest on bonds, appropriations for betterments, or dividends.

"Taxes for the month of June amounted to $9,129,199, or $40 per mile, an apparent decrease of 11.6 per cent., as compared with June, 1910. That this decrease is not actual is due to the fact that in this month of June, the last of the fiscal year, adjustment is made of the amounts estimated to represent one-twelfth of the annual taxes which are included in the returns reported month by month during the fiscal year. The tax item for the whole fiscal year increased 2.2 per cent. in 1911 as compared with 1910.

"The operating ratio for June was 68.6 per cent. compared with 69.5 per cent. in May, 1911, and 67.6 per cent in June, 1910.

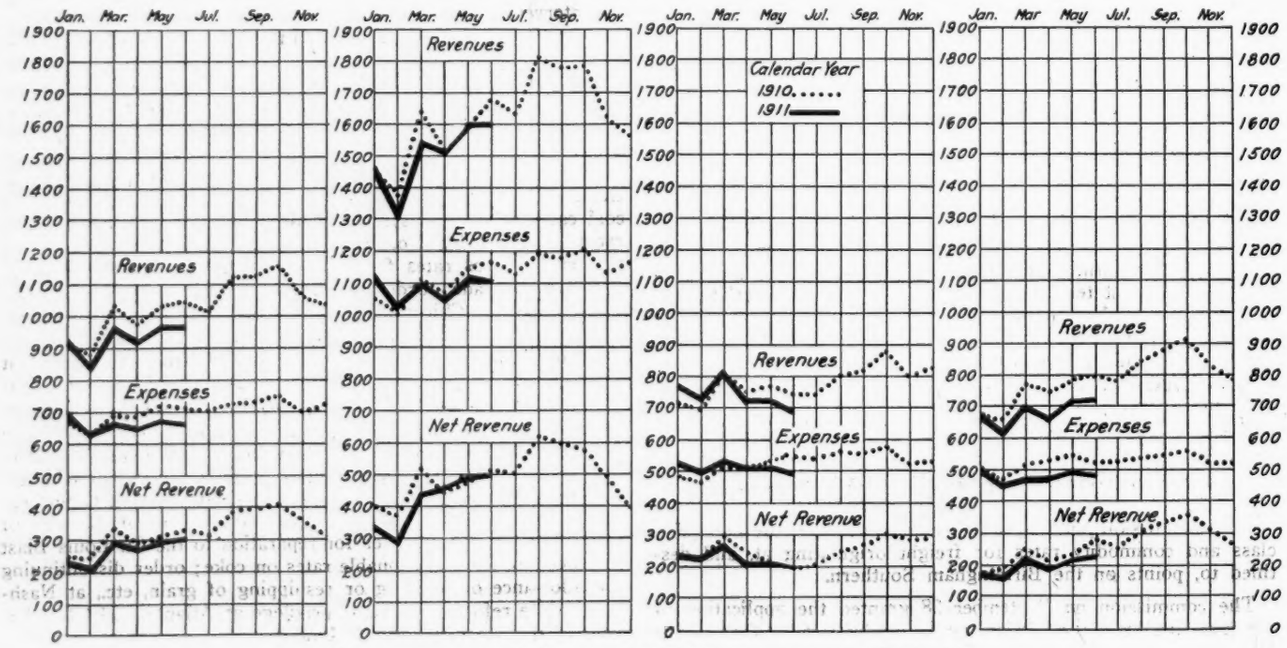
"The western group of railways in June showed a decrease in operating revenues per mile as compared with June, 1910, of 8.5 per cent., while the operating revenues of the eastern and southern groups were respectively very nearly the same as for June, 1910. While the western railways were able to do more towards reducing expenses than the eastern or southern groups, yet they did not succeed in overcoming the decrease in operating revenues. The result is that the net operating revenue of the western group per mile declined 17.2 per cent. in June, as compared with 1910, while the southern group shows an increase of 0.4 per cent., and the eastern group 2.9 per cent. Returns for the whole fiscal year show that taxes increased in 1911, as compared with 1910, 4.7 per cent. for the eastern group, 9.5 per cent. for the southern group, and decreased 1.8 per cent. for the western group."

The following table is an abstract of the selected percentages and averages published in Bulletin No. 19:

	June, 1911.	June, 1910.	Fiscal yr. ended June 30, 1911.	Fiscal yr. ended June 30, 1910.
Percentage of total operating revenues—				
Freight revenue	66.9	68.4	68.6	69.4
Passenger revenue	24.8	23.7	23.8	22.7
Maintenance of way and structures.	14.5	14.7	13.1	13.4
Maintenance of equipment	15.0	14.5	15.4	15.0
Traffic expenses	2.2	2.2	2.1	2.0
Transportation expenses	34.1	33.5	35.6	33.4
Total operating expenses	68.6	67.6	68.7	66.3

Fruitful Farms of Long Island.

The belief, formerly supposed to be quite prevalent in some sections, that the Republican party was the power which ought to be thanked for the favorable weather which gave the country its bountiful crops, was a facetious fiction. To accord to President Peters of the Long Island Railroad the whole credit for the recent great improvement in farming on the barren sands of Quoge, Shinnecock, Massapequa and Speonk, would perhaps also be wide of the mark; and yet, in view of the importance of his initiative in the promotion of scientific methods, beginning six or eight years ago, he can "point with pride," surely. The press agent of the road, in a statement just issued, says that the shipments of produce this year in the single month of August filled 887 cars; and the September record, when made up, will show more than twice as many. Weather conditions have been favorable, and the application of scientific farming methods has been more general than ever before. The August shipments aggregated 13,316 tons, and consisted of fruits, berries, potatoes, cauliflower, cabbage and other garden truck. This quantity represents an increase of 8,087 tons, or 154.7 per cent. over the corresponding month of 1910. The first 1,500 carloads sent to New York City and vicinity in September were made up as follows: Potatoes, 709 carloads; cucumbers, 424; mixed, 112; cauli-



A Comparison of 1910 and 1911 Total Revenues and Expenses.

flower, 88; cabbage, 88; pickles, 43; apples, 36; tomatoes, 22; pears, 6; carrots, 3; turnips, 2; cranberries, 1; watermelons, 1; beets, 1; onions, 1. Thousands of people interested in farm development visit the experimental stations of the road at Medford and Wading River annually to see the modern and model farms, and to learn how more than 350 varieties of vegetables are raised on a very limited acreage, which only six years ago was regarded as worthless property. At the New York State Fair in Syracuse this year Long Island was represented by an entire carload of fruits, vegetables, dairy products, preserves and other commodities.

Appeal to Commerce Court in Pacific Coast Rate Cases.

Counsel for the transcontinental railways on October 3 filed petitions with the Commerce Court, asking it to enjoin the Interstate Commerce Commission from enforcing its orders in the Spokane, Salt Lake and other western rate cases. The preliminary hearing is set for October 17. The roads claim they cannot comply with the commission's orders without unnecessary and harmful disturbances of business conditions and unreasonable reduction of their earnings. They believe the direct reductions in railway earnings which would be made by obedience to the orders would amount to not less than $12,000,000 a year.

In their petitions they deny the constitutionality of the long and short haul clause as amended by the Mann-Elkins act. They contend that even if it be constitutional the commission's orders are not legal. The orders issued by the Commission on June 22, 1911, in the Spokane and other cases forbid the roads in future to make their rates to intermediate points from St. Paul and the Missouri river any more than to the coast; from Chicago more than 7 per cent. higher than to the coast; from Pittsburgh more than 15 per cent. higher and from New York more than 25 per cent. higher. The Commission has specified in other opinions in these cases numerous commodity rates to Spokane, Salt Lake City, etc., which it has held would be reasonable; and the railways say that they could not obey the Commission's order of June 22, and continue to apply their present rates to the Pacific coast without making lower rates to the intermediate points than the very rates to Salt Lake City which the commission itself has held would be reasonable. The position of the roads is stated in the petition presented to the Court as in part follows (Union Pacific Railroad et al vs. United States of America):

"Though the rates now charged by your petitioners on transcontinental traffic moving to Pacific Coast terminals are not fully compensatory and are not as great as your petitioners might reasonably exact for the service rendered, they yield something in excess of the out-of-pocket expense incident to the handling of the traffic moving under said rates, and therefore contribute something to the return which your petitioners are entitled to earn upon their properties, and said order of said commission in requiring your petitioners to forego said terminal business or to reduce their rates to interior points below the just and reasonable rates which they are entitled to charge will result in the taking of your petitioners' property without due process of law and is confiscatory and void. If in order to continue in the business of moving traffic to the Pacific Coast terminals your petitioners were to comply with the requirements of said order of June 22, 1911, by depressing their rates to interior points so that the same should not exceed from Zone No. 1, the rates from Zone No. 1 to the Pacific Coast terminals and so that the same should not exceed from the other zones described in said order the rates to said Pacific Coast terminals by more than the differentials prescribed in said order, your petitioners would be required to accept and carry the business moving to said interior points at rates so low that the entire revenue therefrom, together with all other revenues accruing to your petitioners, would not be a fair return upon the fair value of your petitioners' property devoted to the public service."

INTERSTATE COMMERCE COMMISSION.

The commission has suspended until January 20 the new joint class and commodity rates for freight originating at, and destined to, points on the Birmingham Southern.

The commission on September 28 granted the application of the lines leading out of Minneapolis for leave to withdraw the reduced rates on flour to New York by lake, which had been filed to become effective October 6. The application of the eastern roads, a week previous, for leave to withdraw their consent to the reduced rates, was denied by the commission.

STATE COMMISSIONS.

The Railroad Commission of Louisiana has ordered that cow peas shall be classed as commercial fertilizer and given the same rates as other commercial fertilizer.

Alfred R. Craven, acting chief engineer in charge of rapid transit construction of the New York Public Service Commission, First district, has been appointed chief engineer, with a salary of $15,000.

The Board of Public Utilities of New Jersey has issued a preliminary order under which railways are compelled to sell commutation tickets to Jersey City, Hoboken, Camden and other points in the state. The railways had stopped issuing commutation tickets to these points following changes of rates.

The Railroad Commission of Louisiana has ordered the Louisiana Railway & Navigation Company to reduce its rates on milk to 1½ cents per gal. for 80 miles and under, and to 2 cents per gal. for over 80 miles. The railway is permitted to charge the full rate for the capacity of the can, whether the cans are filled or only partly filled, and shipments of cans having a capacity of more than 10 gal. may be refused. Empty cans are to be returned to the owners free, and shippers may be required to load or assist in loading cans into the cars.

The Railroal Commission of Louisiana, in dismissing a complaint brought by passengers traveling on excursion trains, says in part: "The commission realizes the difficulties which railways have in time of large excursions to run on schedule time or to keep ice water in coaches. Under ordinary circumstances there would have been no excuse for the violation of the rule requiring ice water in passenger coaches, but under the conditions of the excursion, the railway is excusable. However, complaints of this character indicate carelessness on the part of the company which must be limited without delay. The company is warned against reoccurrence in the future."

COURT NEWS.

The docket of the United States commerce court for the October session calls for 14 separate cases in which the railway has appealed from the decision of the Interstate Commerce Commission, two cases where the shipper has appealed from the Interstate Commerce Commission's decision, and one case where the intervener before the commission has appealed from the commission's decision. The total 17 is the number of cases that deal with separate subjects. The appeals from the orders of the Interstate Commerce Commission are as follows: Order fixing rail and water rates on boots and shoes from Boston and New York to Atlanta; order prescribing monthly reports of hours of service of employees; order denying reparation on lumber shipments; order prescribing proportional rates from Rock Island, Ill., to Des Moines, Iowa; order in regard to the allotment of coal cars by the Pennsylvania Rairoad; order establishing class rates from Sacramento, Cal., to points west of Ogden; order prescribing class rates from eastern points to Reno and other points in Nevada; order prescribing class rates from Kansas City, St. Louis, Chicago, Cincinnati and Pittsburgh to Phoenix, Ariz.; order prescribing the rate on beer from Pueblo, Cal., to Leadville; order prescribing rates on lumber from the Southwest to Omaha, etc.; order affecting lighterage charges on sugar at New York; order forbidding the railways to make a distinction in rates between railway fuel coal and other coal; order prescribing local class rates from Roanoke, Va., to Winston-Salem, N. C., etc.; order reducing from $30 to $7.50 per car the charges for refrigeration of pre-iced fruit; the ruling barring claims for reparation presented after two years from date of delivery of freight to consignee; order for reparation to the St. Louis Blast Furnace Co. for unreasonable rates on coke; order discontinuing the allowance of rebilling or reshipping of grain, etc., at Nashville, while refusing the same privilege at Atlanta. The October term of the court opened on Monday.

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

N. M. Leach, traffic manager of the International & Great Northern and the Texas & Pacific, with office at New Orleans, La., has been appointed acting assistant to the president.

W. J. Stoneburner, general manager of the Texas City Terminal Company, at Texas City, Tex., has been elected vice-president and general manager, and R. E. Tipton, general freight agent, has been elected secretary.

The title of Henry Martin, whose appointment as general manager of the International & Great Northern, with office at Houston, Tex., was announced in these columns last week, is second vice-president and general manager, his election as second vice-president having been previously announced.

R. B. Hackney, commercial agent of the Cincinnati Northern at Cincinnati, Ohio, has been elected president and treasurer of the Ohio River & Columbus, the Cincinnati, Georgetown & Portsmouth and the Felicity & Bethel, with office at Cincinnati. C. J. Finger, secretary, treasurer and auditor of the Ohio River & Columbus, has been appointed auditor of the three roads.

Charles M. Hays, president of the Grand Trunk, who has been also president of the Canadian Express Company, has been elected chairman of the board of the latter company. John Pullen, heretofore assistant freight traffic manager of the Grand Trunk, has been elected president of the Canadian Express Company (not vice-president and general manager, as was announced in these columns last week) succeeding Mr. Hays.

G. R. Cottingham, secretary and auditor of the Galveston, Harrisburg & San Antonio, and the Texas & New Orleans, at Houston, Tex., has been appointed auditor of the Houston & Texas Central, the Houston East & West Texas, and the Houston & Shreveport, with office at Houston, succeeding C. C. Barry, who has been appointed auditor of the Texas & New Orleans, with office at Houston, succeeding Mr. Cottingham. The offices of assistant auditor, freight auditor and car accountant of the Texas & New Orleans have been abolished.

Incident to a change in the organization of the executive departments of the Harriman Lines, Judge R. S. Lovett, who has retired from the office of president, has been elected chairman of the executive committee of all those lines. The office of J. Kruttschnitt, director of maintenance and operation, has been moved from Chicago to New York. L. J. Spence, principal assistant to J. C. Stubbs, has been selected to succeed Mr. Stubbs on his retirement on January 1, 1912, as director of traffic, and his office will be in New York. A. L. Mohler, vice-president and general manager of the Union Pacific at Omaha, Neb., has been elected president of that road, with office at Omaha. William Sproule, president of Wells, Fargo & Company, has been elected president of the Southern Pacific Company, with office at San Francisco, Cal. J. D. Farrell, vice-president and general manager of the Oregon-Washington Railroad & Navigation Company at Seattle, Wash., has been elected president of that company with office at Portland, Ore. Thornwell Fay, vice-president and general manager of the Southern Pacific lines in Texas and Louisiana at Houston, Tex., has been elected president of those lines, with office at Houston, and Epes Randolph, vice-president of the Southern Pacific Railroad Company of Mexico at Tucson, Ariz., has been elected president of that company with office at Tucson. (See article on page 629.)

E. H. Fitzhugh, first vice-president of the Grand Trunk, at Montreal, Que., having been elected president of the Central Vermont Railway, the Central Vermont Transportation Co., the Southern New England Railroad Corporation, the Southern New England Railway and the Montreal & Southern Counties Railway, relinquishes his duties in connection with his former position to devote his time to the affairs of the companies named. He will also perform such duties in connection with other subsidiary lines of the Grand Trunk as may hereafter be assigned to him. The practice of designating the several vice-presidents of the Grand Trunk by numbers has been discontinued. William Wainwright, second vice-president, is now vice-president; M. M. Reynolds, third vice-president, is now vice-president, in charge of financial and accounting departments; Howard G. Kelley, chief engineer, has been elected vice-president, in charge of construction, transportation and maintenance departments. J. E. Dalrymple, assistant freight traffic manager of the Grand Trunk Pacific, has been elected vice-president of the Grand Trunk, in charge of traffic, as was announced in these columns last week. Mr. Dalrymple has been elected also fourth vice-president of the Grand Trunk Pacific, in charge of traffic. R. S. Logan, assistant to president of the Grand Trunk and the Grand Trunk Pacific, has been elected vice-president, in charge of land, tax, claims and mail departments, and D. E. Galloway, succeeds Mr. Logan, all with offices at Montreal.

B. D. Caldwell, vice-president of the Delaware, Lackawanna & Western, at New York City, has been elected president of Wells, Fargo & Co., succeeding William Sproule. Mr. Caldwell was born in Placerville, Cal., in 1858, and began railway work in 1873, as a clerk in the auditor's office of the Vandalia Railroad at Terre Haute, Ind. In 1881 he was appointed chief clerk in the general passenger and ticket department of the same road at St. Louis, Mo., and in 1885 he was appointed chief clerk in the general passenger and ticket department of the Missouri Pacific and the St. Louis, Iron Mountain & Southern railways at St. Louis. He remained in this position until 1888, when he was appointed assistant general passenger agent of these lines. In June, 1892, he was elected chairman of the Western Passenger Association, with headquarters at Chicago, Ill., which position he held until he was appointed traffic manager of the Delaware, Lackawanna & Western in July, 1899, and since April 25, 1902 he has been vice-president in charge of traffic of the same road.

B. D. Caldwell.

Operating Officers.

W. H. Beeks, car superintendent of the Georgia, Southern & Florida, at Macon, Ga., has resigned.

Warren B. Nissly has been appointed superintendent of the Schuylkill Navigation Company, succeeding E. F. Smith, retired.

H. W. Weems has been appointed trainmaster of the Shreveport, McKinney and Mineola divisions of the Missouri, Kansas & Texas.

Edward C. Hall, assistant general manager of the East Broad Top Railroad & Coal Co., has been appointed general manager, with office at Orbisonia, Pa.

J. W. Martz has been appointed trainmaster of the First and Second districts of the First division of the Denver & Rio Grande, with office at Pueblo, Colo., succeeding H. S. Monehan, resigned.

J. W. Roberts, car accountant of the Vandalia Railroad, at Terre Haute, Ind., has been appointed superintendent of car service, with office at Terre Haute, and his former office has been abolished.

H. Billings, district freight solicitor and agent of the Union Line of the Pennsylvania Railroad, at Philadelphia, Pa., has been appointed eastern superintendent, with office at Philadelphia, succeeding V. C. Williams, promoted.

William F. Ray, superintendent of the Concord division of the Boston & Maine, at Concord, N. H., has been appointed super-

intendent of the Portland division, with office at Boston, Mass., succeeding William Merritt, resigned.

R. M. White, division engineer of the Scranton and Bangor & Portland divisions of the Delaware, Lackawanna & Western, at Scranton, Pa., has been appointed superintendent of the Bangor & Portland division, with office at Easton, Pa.

M. C. Hughes, trainmaster of the Chicago, Burlington & Quincy at Burlington, Iowa, has been appointed trainmaster of the St. Joseph division, with office at St. Joseph, Mo., succeeding H. R. Lewellyn, transferred. N. C. Allen, trainmaster at Centerville, Ia., succeeds Mr. Hughes.

J. A. Fox, superintendent of the Ashland division of the Chesapeake & Ohio, at Ashland, Ky., has been appointed superintendent of the Chicago division, with office at Peru, Ind., succeeding M. S. McDonald, transferred. W. L. Booth, assistant superintendent of the Cincinnati division, succeeds Mr. Fox, and his former position has been abolished.

William J. English, chief trainmaster of the Erie Railroad, at Jersey City, N. J., has been appointed assistant superintendent of the New York division of the Erie and the New Jersey & New York, with office at Jersey City. J. G. June, engineer of the New York division, has been appointed assistant superintendent of terminals, with office at Jersey City.

John Dwyer, superintendent of the Wyoming division of the Colorado & Southern at Cheyenne, Wyo., has been appointed superintendent, with office at Denver, Colo., succeeding W. M. Bacon, resigned to accept service with another company. H. E. Renick, also superintendent at Denver, has had his jurisdiction extended over the Wyoming division, succeeding Mr. Dwyer.

H. B. Lancaster, W. H. Dressel, L. L. Wyckoff and M. C. Williams have been appointed assistant superintendents of the Oregon-Washington Railroad & Navigation Company, under the Hine system of operation, all with offices at North Yakima, Wash. The titles of master mechanic, division engineer and chief despatcher have been discontinued on the Yakima division.

W. Wackher, assistant superintendent of the Cherokee, Joplin and Neosho divisions of the Missouri, Kansas & Texas at Parsons, Kan., has been appointed assistant superintendent of the Parsons, Sedalia and Kansas City divisions and the El Dorado and Iola branches, with office at Parsons, succeeding K. A. Easley, promoted. F. P. Stocker succeeds Mr. Wackher.

The Chesapeake & Ohio of Indiana having been divided into two districts, W. B. Allen, formerly trainmaster with jurisdiction over the entire line, has been appointed trainmaster with jurisdiction over the Wabash district, from Marion to Hy Tower, with office at Peru, Ind. G. J. Derbyshire, train despatcher of the Chesapeake & Ohio at Ashland, Ky., has been appointed trainmaster of the Miami district, from Marion to Summit, with office at Richmond, Ind.

John Jermone Corcoran, who has been appointed superintendent of the Cincinnati, Hamilton & Dayton, with office at Dayton, Ohio, was born March 27, 1868, at Wood Lawn, Ohio, and graduated in 1884 from St. Xavier's College, Cincinnati, Ohio. He began railway work with the Cincinnati, Hamilton & Dayton in 1886 as a coach carpenter in the shops at Cincinnati. He was successively locomotive fireman, locomotive engineer and traveling engineer, and from December, 1905, to April, 1910, was trainmaster, with office at Lima, Ohio. He was then for six months traveling engineer of the Chicago Great Western at Des Moines, Iowa, returning to the Cincinnati, Hamilton & Dayton as inspector of transportation in September, 1910. He was appointed trainmaster, with jurisdiction over the Toledo division, three months later, which office he held until his promotion to superintendent as above.

James M. Shea, whose appointment as general superintendent of the Seaboard Air Line, with office at Portsmouth, Va., has been announced in these columns, was born June 5, 1859, at Philadelphia, Pa., and was educated in the public schools. He began railway work in 1873 as a telegraph messenger on the Philadelphia & Reading, and in 1875 was placed in charge of the telegraph office. Three years later he went to the Shenandoah Valley Railroad, now a part of the Norfolk & Western, as relief clerk, and two years later was transferred to the Norfolk & Western, he was consecutively, train despatcher, chief train despatcher and trainmaster on that road. In June, 1898 he went to the South Carolina & Georgia as trainmaster, and in 1901, when the Southern Railway took over this company, he was transferred to the Washington division as chief despatcher. In May, 1902 he went to the Seaboard Air Line as yardmaster, at Portsmouth, Va., and the same year was appointed trainmaster of the First division, becoming superintendent of the Sixth division in 1905. Mr. Shea was then superintendent of the Birmingham division, and later superintendent of the Second division, and at the time of his recent appointment was superintendent of the Third division, with office at Atlanta, Ga.

Traffic Officers.

L. S. Winslow has been appointed general baggage agent of the Chicago & Eastern Illinois, with office at Danville, Ill.

J. A. Hickman has been appointed assistant westbound agent of the Cleveland, Cincinnati, Chicago & St. Louis, with office at St. Louis, Mo.

S. Halline, traveling freight agent of the Missouri, Kansas & Texas at Denver, Colo., has been appointed commercial agent, with office at Denver.

G. F. Kay has been appointed soliciting freight agent of the Queen & Crescent Route, with office at Dallas, Tex., succeeding G. C. Whitney, promoted.

M. G. Murphy has been appointed district passenger agent of the Canadian Pacific, with office at Toronto, Ont., succeeding R. L. Thompson, resigned.

W. D. Jones, district passenger agent of the Chicago Great Western at Pittsburgh, Pa., has been appointed soliciting freight agent of the Tennessee Central, with office at Chicago.

George C. Whitney has been appointed an agent of the Alabama Great Southern and the Cincinnati, New Orleans & Texas Pacific, to solicit interstate freight from points in Texas.

George F. Hutchinson, assistant general agent of the Adams Express Company at Chicago, has been appointed general agent of the Northern Express Company, with office at Chicago.

C. J. Hooker has been appointed traveling freight and passenger agent of the Texas Central, with office at Waco, Tex., succeeding Elbert Blair, resigned to accept service with another company.

H. S. Hinton, formerly commercial agent of the Texas & Pacific at Shreveport, La., has been appointed tariff inspector, with office at Dallas, Tex., succeeding A. Baker, assigned to other duties.

John S. Moses, soliciting freight agent of the Cincinnati Northern at Cincinnati, Ohio, has been appointed commercial agent, with office at Cincinnati, succeeding R. B. Hackney, resigned.

R. B. Herrington, soliciting freight agent of the Tennessee Central at St. Louis, Mo., has been appointed traveling freight agent, with headquarters at St. Louis, and W. Morgan succeeds Mr. Herrington.

F. E. Pettibone, contracting freight agent of the Chicago Great Western at Milwaukee, Wis., has been appointed general agent in the freight department, with office at Milwaukee, succeeding J. H. Sayle, resigned.

R. H. Winchester has been appointed traveling passenger agent of the Chicago & Alton and the Toledo, St. Louis & Western, with office at Pittsburgh, Pa., succeeding J. W. O'Brien, resigned to accept service with another company.

L. J. Spence, assistant director of traffic of the Harriman Lines at Chicago, will become director of traffic of all those lines, effective January 1, 1912, on the retirement of J. C. Stubbs from that position, and his office will be removed from Chicago to New York. (See article on page 629.)

E. T. Willcox, assistant general freight agent of the St. Louis & San Francisco, at Memphis, Tenn., has been appointed assistant general freight agent, with office at St. Louis, Mo., and George F. MacGregor, freight claim agent at St. Louis, succeeds Mr. Willcox, the office of freight claim agent having been abolished.

R. J. Smith, general agent of the Great Northern at Cincinnati, Ohio, has been appointed district freight and passenger agent, with office at Grand Forks, B. C., succeeding V. Kistler,

assigned to other duties. W. E. Hunt, traveling freight agent at St. Louis, Mo., succeeds Mr. Smith, and R. C. Foote succeeds Mr. Hunt.

P. A. Marr, district passenger agent of the Illinois Central at Pittsburgh, Pa., has been transferred to Cincinnati, Ohio. G. G. Truesdale, city passenger agent at Chicago, succeeds Mr. Marr, and J. P. Brown, traveling passenger agent at Nashville, Tenn., succeeds Mr. Truesdale. H. C. Cantwell, Florida passenger agent at Jacksonville, Fla., succeeds Mr. Brown, and S. C. Baird succeeds Mr. Cantwell.

John William Loud, freight traffic manager of the Grand Trunk, the Grand Trunk Pacific and the Central Vermont, with headquarters at Montreal, Que., who was retired under the pension rules on September 30, as has already been announced in these columns, was born March 10, 1846, at Warwickshire, Eng. He received a commercial education and began railway work August 9, 1861, with the Midland Railway Company of England, remaining in the service of that company until August, 1872. The following month he went to the Grand Trunk as a clerk in the general freight agent's office at Montreal, and in January, 1875, was appointed freight agent at Hamilton, Ont. From April, 1875, to August, 1877, he was chief clerk to the assistant general freight agent at Toronto, and then for about four years was chief clerk to the general freight agent at Montreal. In November, 1881, he was appointed freight agent at Toronto, and in January, 1887, was appointed general freight agent in charge of through traffic, with office at Detroit, Mich. From September, 1889, to February, 1896, he was traffic manager of the Detroit, Grand Haven & Milwaukee, and from February, 1896, to April, 1900, was general freight agent of the Grand Trunk. Mr. Loud has been freight traffic manager of the Grand Trunk and the Central Vermont since May, 1900, and since September, 1907, was also freight traffic manager of the Grand Trunk Pacific.

Engineering and Rolling Stock Officers.

Frank L. Brooks has been appointed supervisor of bridges and buildings of the Rutland Railroad, with office at Rutland, Vt.

H. R. Safford has been appointed chief engineer of the Grand Trunk, with office at Montreal, Que., succeeding H. G. Kelley, promoted.

R. E. French has been appointed master mechanic of the Liberty-White Railroad, with office at McComb City, Miss., succeeding S. C. Honea, resigned.

J. P. Congdon, supervising engineer of the Oregon Short Line, with office at Pocatello, Idaho, has resigned to engage in the general practice of his profession at Boise and Pocatello.

Stephen Motta, general foreman of the Aguascalientes shops of the National Railways of Mexico, has resigned to become master mechanic of the National Iron & Steel Works, Mexico City, Mexico.

J. C. Baxter, division engineer of the Oregon Trunk Railway at Portland, Ore., has been appointed division engineer of the Oregon Electric Railway, in charge of construction of the line from Salem, Ore., to Albany.

C. D. Young, assistant engineer of motive power of the Pennsylvania Lines West, at Pittsburgh, Pa., has been appointed engineer of tests, of the Pennsylvania Railroad, with office at Altoona, succeeding E. D. Nelson.

J. W. Gibbs, foreman of locomotive repairs of the Southern Railway, at Asheville, N. C., has been appointed master mechanic of the Virginia & Southwestern, with office at Bristol, Va.-Tenn., succeeding R. G. Cox, resigned.

Charles H. Moore, engineer of grade crossings of the Erie Railroad, at New York City, has been appointed principal assistant engineer, with office at New York. Robert C. Falconer, assistant engineers, at New York, has been appointed engineer of the New York division, with office at Jersey City, N. J., succeeding J. G. June, transferred.

F. I. Cabell, chief engineer maintenance of way of the Chesapeake & Ohio at Richmond, Va., has been appointed chief engineer, and his former position and the office of H. Pierce, chief engineer of construction have been discontinued. The chief engineer will, under the direction of the first vice-president, have charge of all construction work and will in addition provide standards for the maintenance of way department.

D. W. Thrower, roadmaster of the Yazoo & Mississippi Valley at Memphis, Tenn., has been appointed roadmaster of the Illinois Central, with office at Chicago, succeeding G. E. Boyd, resigned to accept service with another company. J. L. Downs, roadmaster of the Yazoo & Mississippi Valley at Vicksburg, Miss., succeeds Mr. Thrower, and E. I. Rogers, engineer in charge of construction forces at New Orleans, succeeds Mr. Downs.

G. E. Boyd, formerly roadmaster of the Illinois Central, at Chicago, has been appointed superintendent of bridges and buildings of the Delaware, Lackawanna & Western, with office at Scranton, Pa., succeeding W. B. Hixson, deceased. L. L. Tallyn, superintendent of water service, at Scranton, has been appointed division engineer of the Scranton and Bangor & Portland divisions, at Scranton, in charge of engineering and water service, succeeding R. M. White, transferred.

W. P. Hobson, master mechanic of the Cincinnati division of the Chesapeake & Ohio, at Covington, Ky., has been appointed superintendent of motive power of the Kentucky & Indiana general division, succeeding W. T. Smith, retired. H. M. Brown succeeds Mr. Hobson, and H. C. Gillispie, general foreman at Russell, Ky., has been appointed master mechanic of the Chicago division, with office at Peru, Ind., succeeding C. H. Doebler, who becomes assistant master mechanic of the Huntington division, with office at Huntington, W. Va. M. I. Forbes, engineer of the Ashland division, has been appointed engineer of the Cincinnati division, with office at Covington, Ky., succeeding F. H. Haskell, transferred. A. E. Botts, assistant engineer of the Kentucky & Indiana general division, succeeds Mr. Forbes, and C. E. Roland succeeds Mr. Botts.

Purchasing Officers.

J. N. Shaw, secretary to the president of the Delaware, Lackawanna & Western, at New York, has been appointed general storekeeper, with office at Scranton, Pa., succeeding W. F. Girten, resigned.

M. S. McDonald, superintendent of the Chicago division of the Chesapeake & Ohio, has been appointed superintendent of stores, with headquarters at Huntington, W. Va., in charge of all stores of the company, both in the maintenance of way and motive power departments. He will report to the general manager. The general storekeeper will report to the superintendent of stores, and the division storekeeper will report to the general storekeeper, instead of to the master mechanics.

Special Officers.

Herman Von Schrenk has been appointed consulting timber engineer of the St. Louis & San Francisco, with headquarters at St. Louis, Mo., reporting to W. C. Nixon, vice-president.

OBITUARY.

J. V. Clayman, formerly traveling passenger agent of the Chicago, Burlington & Quincy at Cincinnati, Ohio, died at Spokane, Wash., on September 21.

Robert Given, assistant claim agent of the Missouri, Kansas & Texas of Texas with office at Dallas, Tex., died at his home in Oak Cliff, Tex., on September 22.

F. H. Scheffer, superintendent of machinery of the Nashville, Chattanooga & St. Louis, at Nashville, Tenn., died on October 2 at Chicago. Mr. Scheffer was born August 8, 1855, at Orebo, Sweden, and graduated from the Polytechnical Institute at Munich, Germany, in 1880. The following year he began railway work as a machinist on the Pennsylvania Railroad, and in March, 1882, he was appointed draughtsman. He left the service of that company in September, 1883, to go in the same capacity to the New York, West Shore & Buffalo, now a part of the West Shore Railroad. From December, 1883, to June, 1887, he was assistant chief draughtsman of the Norfolk & Western, and then for four months, he was chief draughtsman of the Cincinnati, New Orleans & Texas Pacific. In October, 1887, he went to the Nashville, Chattanooga & St. Louis as chief draughtsman. From September, 1899, to February, 1903, he was general foreman on the same road, and was then appointed superintendent of machinery.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The Oregon Electric, Portland, Ore., is in the market for 4 electric locomotives.

The San Pedro, Los Angeles & Salt Lake is said to be in the market for 6 mikado locomotives. This item has not been confirmed.

The Boston & Maine, it is said, is making inquiries for 50 locomotives. This item has not been confirmed.

The International & Great Northern is said to be in the market for 20 freight locomotives. This item has not been confirmed.

The Buffalo Creek & Gauley has ordered 1 consolidation locomotive from the Baldwin Locomotive Works. The dimensions of the cylinders will be 20 in. x 24 in., the diameter of the driving wheels will be 50 in., and the total weight in working order will be 137,000 lbs.

The Toronto, Hamilton & Buffalo has ordered 2 superheater consolidation locomotives from the American Locomotive Company. The dimensions of the cylinders will be 23 in. x 28 in., the diameter of the driving wheels will be 55 in., and the total weight in working order will be 201,000 lbs.

CAR BUILDING.

The New York Central is making inquiries for from 1,000 to 2,000 box cars.

The Oregon Electric, Portland, Ore., is in the market for 6 motor cars and 10 coaches.

The Delaware, Lackawanna & Western is making inquiries for from 100 to 200 refrigerator cars.

The Boston & Maine, it is said, is making inquiries for 50 passenger cars and 500 freight cars. This item has not been confirmed.

The International & Great Northern is said to be in the market for 20 coaches and 500 coal cars. This item has not been confirmed.

The Erie has ordered 100 refrigerator cars from the Pullman Company and 100 refrigerator cars from the Western Steel Car & Foundry Company.

The Florida East Coast has ordered 50 flat cars and 150 hopper cars from the Pressed Steel Car Company, and 16 passenger cars from the Pullman Company.

The Fidelity Securities Corporation, Nashville, Tenn., is making inquiries for 4 interurban single end operation steel passenger car bodies and 1 double end operation steel baggage car body.

The Lehigh Valley is taking prices on 15 four-wheel-truck combination baggage and postal cars, 5 four-wheel-truck combination baggage and passenger cars, and 5 six-wheel-truck combination baggage and passenger cars.

The Pennsylvania, mentioned in the *Railway Age Gazette* of September 22 as making inquiries for 1,150 freight cars and from 75 to 100 steel passenger and baggage cars, has ordered 850 gondola cars and 300 hopper cars from the Cambria Steel Company.

The Buffalo, Rochester & Pittsburgh has ordered 500 fifty-ton all-steel hopper cars from the Pressed Steel Car Company, 500 fifty-ton all-steel hopper cars from the Standard Steel Car Company and 500 fifty-ton all-steel hopper cars from the Cambria Steel Company.

The Louisville & Nashville, mentioned in the *Railway Age Gazette* of September 29 as being in the market for 1,000 steel underframes for reinforcing box cars and hopper cars, has divided this order equally between the Pressed Steel Car Company and the Mt. Vernon Car Manufacturing Company.

IRON AND STEEL.

The Boston & Maine has ordered 600 tons of bridge steel from the Boston Bridge Company.

The Pennsylvania has ordered 5,000 tons of structural steel from the Fort Pitt Bridge Company.

The Missouri Pacific has ordered 1,800 tons of rails for use on the St. Louis, Iron Mountain & Southern.

The New York Central is in the market for 1,500 tons of bridge steel for the bridge at Oswego, N. Y.

The Atchison, Topeka & Santa Fe has ordered 20,000 tons of 90-lb. open hearth rails from the Illinois Steel Company.

The Hagerstown & Clearspring, Hagerstown, Md., has placed an order for 1,200 tons of rails with the Maryland Steel Company.

The Hagerstown & Clear Spring, Hagerstown, Maryland, has ordered 1,200 tons of rails from the Maryland Steel Company.

The Pittsburgh & Lehigh Dock Company has divided an order for 2,050 tons of structural steel for coal handling bridges at Duluth, Minn., between the Milwaukee Bridge Company and the Minneapolis Steel & Machinery Company.

General Conditions in Steel.—Conditions in the steel industry are very unsettled. The mills are operating at a large percentage of their capacity, due to the large number of small orders. Prices are distressingly low and there is reason to believe that the bottom has not yet been reached. Price conferences between the heads of the Steel Corporation and the independent steel companies have been discontinued on account of the investigation, and the result is an open market. The margin of profit is very narrow, and in some cases almost nil, so any further reduction of prices will very likely be accompanied by a downward revision of wages. The strike on the Harriman Lines and the war are disturbing features.

MACHINERY AND TOOLS.

The Louisville & Nashville has ordered from the Ingersoll-Rand Company a cross compound, Corliss, type 0-6 air compressing engine having a 36-in. stroke and a capacity of 4,000 cu. ft. per minute. The machine will be used in the shops at South Louisville, Ky.

FOREIGN RAILWAY NOTES.

The Great Northern Central line in Columbia starts from Puerto Wilches, on the Magdalena river, and is under construction toward Bucaramanga, with the ultimate expectation of being built to the capital. Work was temporarily suspended in July, 1910, but the line is in operation for a short distance.

A concession has been granted for a new railway from Leoganes to Aux Cayes, in the southern part of Haiti. The line will pass through Leoganes, Grand Goave, Petit Goave, Miragoane, Aquin, St. Louis, and Cavaillon, to Les Cayes, a distance of 100 miles. Branch lines can be built to Port au Prince, Jacmel, Asile, Anse a Veau, Jeremie, and Port Salut.

Additions were made during 1910 to many of the northern lines of Brazil, which will tend to bring into close communication the states of Ceara, Rio Grande do Norte, Parahyba, Pernambuco and Alagoas. The Federal government entered into a new contract with the company controlling the lines in the last-named state, whereby certain extensions of existing lines and new branches are to be constructed, which, when completed, will form a system traversing the greater part of the state and connecting it with Goyaz on the west and Minas Geraes on the south. The Timbo and Propria line, which is to form part of this system, will, when completed, form the connecting link with the state of Sergipe. When a connection is established between this line and Maceio, in Alagoas, and those contemplated in Bahia and Minas Geraes have been completed, all the Atlantic ports from Natal south will have rail connection.

Supply Trade News.

The Chicago Pneumatic Tool Company, Chicago, has made the Holden Company, Montreal, Que., its general sales agency in Canada.

Morris M. Rosenwald, of Chicago, has been made a director of the Westinghouse Air Brake Company, Pittsburgh, Pa., succeeding George C. Smith, for many years connected with the Westinghouse interests, but who recently resigned from all the Westinghouse companies.

The Roberts & Schaefer Company, Chicago, has been awarded a contract by the Illinois Central for designing and constructing, complete in operation, a 500-ton Holmen counterbalanced bucket locomotive coaling station at Carbondale, Ill. The approximate contract price will be $12,000.

The Nathan Manufacturing Company, New York, has adopted the use of vanadium bronze in the manufacture of its products. After two years of tests a special mixture was adopted which has a tensile strength of 71,000 lbs., and an elastic limit of 28,000 lbs. It was found that by the use of this mixture the life of the metal was increased. The Nathan company is the exclusive user of this mixture in the manufacture of injectors, lubricators and other articles made by it.

The Western Electric Company, Chicago, recently established a new record by making and shipping 15,000 ft. of 100 pair lead covered cable in two days. This cable was ordered by the Southern Bell Telephone Company to re-establish communication at Charleston, S. C., after the hurricane. In filling this order, nearly 12,000 lbs. of copper conductor, over 40,000 lbs. of lead, and over 1,300 lbs. of tin were used. The Western Electric Company uses annually, in the manufacture of telephone cable, 20,000,000 lbs. of copper conductor, over 100,000,000 lbs. of lead, 3,000,000 lbs. of tin and 4,000,000 lbs. of insulating paper.

TRADE PUBLICATIONS.

Linseed Oil.—The Sterling Varnish Company, Pittsburgh, Pa., has published a small folder explaining the difference between the hot and cold pressed linseed oil and the company's raw refined linseed oil.

Pyroscope.—The Shore Instrument & Manufacturing Company, New York, has issued a pamphlet on the pyroscope, which is an optical pyrometer. The instrument is described, its advantages mentioned, and several rules are given concerning the heat treatment of different steels.

Electric Machinery.—The Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.; has issued Circular No. 1190, which gives a description of the construction and the power factor conditions of the company's type *E*, 50-1100 k. v. a., 2-phase, 60-cycle, 240-2400 volt, engine-driven, a. c. generators; also circular No. 1028, which describes the Westinghouse rotary converters.

Locomotives.—The American Locomotive Company, New York, has issued bulletin No. 1010 entitled What Mallet Locomotives Save and Why, based on results of recent tests on the Norfolk & Western. The tests were made on the division between Roanoke, Va., and Christiansburg where there is a continuous grade of about 1.32 per cent. and the results showed that one Mallet locomotive could haul a train of 1,180 tons that formerly required a class M-1 twelve-wheel and a class W consolidation locomotive working together, and that the Mallet used 36 per cent. less coal.

Locomotive Fireboxes.—The Jacobs-Shupert United States Firebox Company, New York, has recently issued a complete catalog on the Jacobs-Shupert sectional firebox. It is printed on heavy 8 in. x 11 in. glazed paper, and is bound in stiff covers. There are 100 pages, well illustrated with photographs and drawings. It is divided into twelve chapters, which give a general description of the construction, the advantages, its action, its service, the water circulation, the evaporation, the cost of maintenance and repairs for this type of firebox. The important advantages claimed for this firebox are its safety and its improved water circulation. The catalog contains reports of tests.

Railway Construction.

New Incorporations, Surveys, Etc.

Aroostook Valley.—See St. John & Quebec.

Atchison, Topeka & Santa Fe.—This company is planning to carry out double-tracking work on 112 miles and put in sidings every five miles, between Denver, Colo., and Pueblo.

British Columbia Electric.—A contract has been given to Moore & Pethick for building an 18-mile extension along the Saanich peninsula, near Victoria, B. C.

Buckhannon & Northern.—This company is building from South Rivesville, W. Va., where connection is made with the Baltimore & Ohio, north to the West Virginia-Pennsylvania state line on the west side of the Monongahela river, under a West Virginia charter; and the Monongahela Railroad under a Pennsylvania charter, is being built from the West Virginia-Pennsylvania state line, north to New Geneva, to a connection with the existing line of the Monongahela Railroad. A grading contract has recently been given to McMennemin & Sireus, Morgantown, W. Va. Arrangements have been made to run trains from Fairmont, over the Baltimore & Ohio tracks, to South Rivesville. The Monongahela Railroad and the Buckhannon & Northern are owned by the same interests.

California Roads (Electric).—A line is to be built from Indian Falls, Cal., near Quincy, it is said, via Indian Creek, to a junction with the Western Pacific. G. H. Goodhue, Indian Falls, is interested.

An electric railway is to be built, it is said, from San Jose, Cal., to New Almaden, about 11 miles. C. P. Andrews is interested.

Canadian Northern.—This company has finished work, it is said, laying 80-lb. rail on the line between Saskatoon, Sask., and Regina, 160 miles. The entire line has been ballasted.

Canadian Pacific.—The Esquimalt & Nanaimo is to be extended, it is said, north to Comox, B. C., and Campbell river.

Chicago & North Western.—An officer is quoted as saying that the new line from Wyeville, Wis., northwest to Milwaukee, will be opened for freight traffic on November 1.

Colorado & Southern.—The new line from Wellington, Colo., north to Cheyenne, Wyo., is to be opened for traffic on October 8. (January 27, p. 183.)

Creston, Winterset & Des Moines.—An officer writes that the plans call for building from Creston, Iowa, north to Spalding, thence northeast via Macksburg and Winterset to Des Moines, about 70 miles. It is the intention to build the section from Creston to Macksburg next year. One half of the proposed cost of this section has been secured by the sale of stock, and it is expected that a bond issue will be made for the other half. Construction work will not be started until 1912. The contract for carrying out the work will be let as soon as the bond issue is secured. There will be only one steel bridge of any importance. Steam will be used as the motive power for handling freight traffic, and gasolene motor cars for the passenger and express service. R. Brown, president, Creston; C. E. Wilson, vice-president, Macksburg; M. F. Harris, second vice-president, Winterset; A. S. Lynn, secretary, Orient, and W. W. Walker, treasurer, Macksburg. (September 29, p. 615.)

Des Chutes Railway.—See Oregon-Washington Railroad & Navigation Company.

Esquimalt & Nanaimo.—See Canadian Pacific.

Florida, Alabama & Gulf.—An officer writes that work has been completed on this line from Falco, Ala., south to Galliver, Fla., 26 miles, where connection is made with the Louisville & Nashville. The principal commodities to be carried are lumber, naval stores, cotton, etc. W. K. Hyer, Jr., president, Falso, Ala.

Grand Trunk Pacific.—An officer sends us the following particulars of the work being carried out by that company: Melville-Regina branch, 98 miles, track laying has been finished; Regina Boundary branch, 130 miles is under construction, grading is 95 per cent. completed and track laying is to be started soon;

Regina-Moose Jaw branch, 40 miles, grading is finished on 30 miles, track laying has not yet been started; Moose Jaw Northwest branch, 48 miles, one-half the grading has been finished, track laying has not yet been started; Young Prince Albert branch, 112 miles, grading has been finished on 86 miles, and track laying on 67 miles; it is expected that all the track will be laid this coming fall. Alberta Coal branch, 56 miles, grading has been finished on 60 per cent. and track laying on 6 miles; Battleford branch, 48 miles, grading is finished on 70 per cent., and 22 miles is ready for track laying; this work has not yet been started. Grading has just been started on the Harte-Brandon branch, and on the Cut Knife branch, the latter is to be 50 miles long; Biggar-Calgary branch, 104 miles, is now under contract, and 50 miles is ready for track laying, work on the rest of the line has been started; Calgary branch, 202 miles, track has been laid on 105 miles, and grading beyond this point has been finished on 75 per cent.; track laying is now in progress. The contractors carrying out this work are J. D. McArthur, Winnipeg, Man.; Rigby & Plummer, Winnipeg; Phelan & Sherley, Bickerdike, Alb.; Lamoreux & Peterson, Battleford, Sask.; J. Daudelin, Battleford, and Duncan McArthur, Winnipeg. Contracts for the remaining 420 miles to complete the main line have been let to Foley Bros., Welch & Stewart.

KETTLE RIVER VALLEY.—An officer writes that work is now under way from Midway, B. C., to Merritt, on about 250 miles. Since the work began in June, 1910, about 65 miles of grading has been finished and track has been laid on 50 miles. It is expected that before the end of 1911, the company will complete an addition 25 miles of track and 10 or 15 miles of grading. Contracts have recently been let for 75 miles of new work, which includes a section of 40 miles to complete the line to Osprey lake, and on a section of 35 miles, from Mile 35 north of Midway, to the Kettle Okanagan summit. No additional contracts will be let for several months. L. M. Rice & Co. are the contractors and are associated with Boomer & Hughes and Grant, Smith & Co.

LOUISVILLE & NASHVILLE.—According to press reports, a contract has been given to T. J. Asher, Wasioto, Ky., to build an extension from Harlan, up Clover fork to Ages creek. This line will reach coal fields in Harlan county. It is thought that the extension will eventually be continued to Appalachia, Va., about 40 miles.

MEXICAN ROADS.—The construction of several new and independent lines of railway will soon be started in Mexico, if applications to the federal government for concessions that are now pending, are granted. These include the following lines: One from Balsas station, Guerrero, on the Mexacala river, southeast to the ports of Zihuatanejos and Acapulco, on the Pacific coast; another is for a line between Vera Cruz, Vera Cruz, and Tampico, via Tuxpam, with a branch to Beristain, Pueblo, also for the construction of an extension of the proposed Vera Cruz-Tampico line, from Tampico, Vera Cruz, north to Matamoros, on the Rio Grande. Application has also been made for the renewal of the concession for a line from Santa Lucrecia, Vera Cruz to Campeche, Campeche, to connect the United Railways of Yucatan with other railways in the republic. It is said that the application for building the line down the gulf coast to connect Matamoros with Vera Cruz and the branch line to Beristain, where connection is to be made with the National Railways of Mexico, has been made by the Frisco interests.

MONONGAHELA RAILROAD.—See Buckingham & Northern.

NEVADA COPPER BELT.—Work has been started on an extension from Hudson, Nev., to Ludwig, 10 miles.

NORTHERN PACIFIC.—Announcement has been made that plans are about ready for the construction of the Lake Union belt line in Seattle, Wash., at a cost of $500,000. It is expected that track laying will be started at once. The company will also shorten the Fremont and Ballard main line, build a bridge over the Lake Washington canal, and reconstruct its Seattle piers. It is expected to have all this work finished during the next 12 months.

OAKLAND & ANTIOCH (Electric).—A contract has been given to the Shattuck-Edinger Company for building from Oakland, Cal., to Walnut Creek.

OREGON TRUNK LINE.—Track laying on this line, now under construction from Fallbridge, Wash., south to Bend, Ore., 156 miles, was finished on September 21, to Redmond, 139 miles, and is expected to be finished further south to Bend by October 5, when James J. Hill will drive the last spike. Regular passenger and freight service is now in operation south to Opal City, 126 miles, from Fallbridge. (May 12, p. 1133.)

OREGON-WASHINGTON RAILROAD & NAVIGATION COMPANY.—The Des Chutes Railway has been opened for regular passenger and freight service, from Des Chutes Junction, Ore., south to Madras, 101 miles. Track laying was recently completed south to Metolius, from which place the tracks of the Oregon Trunk Line will be used to Bend. (July 21, 159).

PUEBLA & PACIFIC.—An officer writes that as soon as conditions are improved construction work will be started on this line from a point on the Pacific coast, in the state of Oaxaca, north via Atoyaquilla, Putla, Juxtlahuaca, Tonala, Tecomatlan, Tezuntlan, Huehuetlan and Tetela, to Puebla, with a branch line northeast to a point near Cahuacua; another branch to San Rafial, and a third branch to Las Reyes. There will also be a branch from Tonala, southeast via Diquillu, Consuelo and Mixtepec. Most of the work will be difficult. Maximum grades will be 1.5 per cent. compensated, except on about 16 miles. Pusher grades will be 3 per cent. compensated in the Huehuetlan canyon. Maximum curvature will be 15 deg. The line expects to find a traffic in coal, corn, cotton, tobacco, timber and fine woods. A. B. Adams, president, New York, and H. N. Roberts, chief engineer, Oaxaca.

ST. JOHN & QUEBEC.—According to press reports the Aroostook Valley has entered into a contract with the New Brunswick provincial government for the construction of the St. John Valley Railway along the St. John river, from St. John, N. B., to Grand Falls and St. Leonards. It is understood that the new line is to be subsidized by the Canadian government. The work is to be started at once. (July 28, p. 198.)

TERMINAL RAILWAY.—An officer writes that surveys are now being made to build in Oregon from a point at the head of the isthmus inlet via Millington, Flagstaff, Bayview, Bunker Hill, Marshfield, North Bend and Empire to Sunset bay, about 30 miles. The company expects to begin construction work this fall at Marshfield, and will lay at least one mile of track this winter. A. Mereen, president; W. S. Chandler, general manager, and P. A. Sandberg, engineer, Marshfield. (September 15, p. 545.)

WASHINGTON ROADS.—A company is being organized to build from Vancouver, Wash., north to the south fork of the Lewis river, thence northeast to Klickitat pass, between 75 and 100 miles. H. L. Harmon, Chicago, is the principal promoter, and E. R. Ernsberger, of the Mount Hood Railway & Power Company, Portland, Ore., is interested.

RAILWAY STRUCTURES.

BAKER CITY, ORE.—The Sumpter Valley will build four new steel bridges, it is said, on its line between Baker City and Sumpter.

BOSTON, MASS.—The improvements to be carried out at the South station in Boston by the Boston Terminal Company, include an addition of two stories to the height of the main five-story building, on Summer street, a distance of 235 ft., to continue on the Dorchester avenue frontage 180 ft., which will provide 250 additional offices. The improvements will cost about $500,000.

BURLINGTON, VT.—According to press reports, plans have been made by the Central Vermont for building a passenger station and eliminating grade crossings in Burlington, at a cost of about $315,000.

LOS ANGELES, CAL.—The San Pedro, Los Angeles & Salt Lake has been given a permit to put up a new freight house on Myers street, Los Angeles, at a cost of $11,500.

LYNCHBURG, VA.—An officer of the Southern Railway writes that a contract has been given to John P. Pettijohn & Co., Lynchburg, for building a passenger station at Lynchburg. The building will be two stories high, 40 ft. x 141 ft., of brick construction with green tiled roof.

North Yakima, Wash.—The Oregon-Washington Railroad & Navigation Co. is preparing plans for an eight-stall frame roundhouse, with a brick fire wall. It is also planned to build a large storehouse at Maple and Third streets.

Omaha, Neb.—The Chicago, St. Paul, Minneapolis & Omaha has let contracts for building a 15-stall roundhouse, semi-detached boiler and machine shop 50 ft. x 140 ft., and a store house 25 ft. x 75 ft. The cost of the entire group of buildings is estimated at $40,000.

Pittsburgh, Kansas.—The St. Louis & San Francisco is contemplating building a two-story brick passenger and freight station to cost approximately $50,000.

Sacramento, Cal.—Plans are being made by the Northern Electric, it is said, to put up a new terminal station at Front and Second streets in Sacramento.

Saskatoon, Sask.—The Canadian Northern will build a brick and concrete one-story storehouse adjoining the roundhouse at Saskatoon.

Seattle, Wash.—See Northern Pacific under Railway Construction.

The Great Northern and the Oregon-Washington Railroad & Navigation Co. have completed the new 1,000-ft. reinforced concrete viaduct on Fourth avenue in Seattle. The viaduct extends from Jackson street to Seattle boulevard and is said to have cost $300,000. The work was carried out jointly by the two roads. (Dec. 23, p. 1208.)

South Bend, Ind.—Track elevation work to abolish grade crossings has been ordered at South Bend. The city will pay about $1,000,000 as its share of the cost of the improvements. There are 23 grade crossings on the Lake Shore & Michigan Southern to be eliminated. (March 10, p. 483.)

Tacoma, Wash.—The Oregon-Washington Railroad & Navigation Company is building a new 150-ft. bridge over the Puyallup river at Tacoma.

The Chicago, Milwaukee & Puget Sound will soon start work, it is said, putting up an addition to its warehouses at Tacoma.

Tillamock, Ore.—The Pacific Railroad & Navigation Co. has given a contract to William Gibson for putting up a new station at Lake Lytle.

Whittier, Cal.—The Pacific Electric will build a new station, it is said, at Whittier.

There are in Haiti about 64 miles of railway in operation. Concessions have been granted from time to time for projects which promised to open up the fertile districts of the republic for exploitation, but until the latter part of 1910 little had been done to carry these plans into execution. There is no regular system of railways, but several short lines serving particular localities. A line is in operation at present running from Cape Haitien to Grand Riviere, a distance of 15 miles; another from Port au Prince to Lake Etang Saumatre, 28 miles, and the Port au Prince-Leoganes Railroad, 20 miles. In August, 1910, the president of the republic signed the contract with the Haitien National Railroad Co., which is building a railway which is to traverse almost the entire country from north to south, with several branches from the city of Gonaives in the northwest. The main line will run from Port au Prince, passing along the coast, through Arcahaie, to St. Marc, 53 miles distant, then following up the great valley of the Artibonite river for about 115 miles, passing Varette, La Chapelle, Mirebalais, Las Coabas, and Hinche and from there running northward, passing Pignon, Savannette, Bahon, and Grand Riviere, to Cape Haitien, the principal northern seaport of Haiti, 205 miles distant. There will be two branch roads. The longer branch will be from the seaport of Gonaives eastward to Hinche, 81 miles, where it joins the main line, having passed through Ennery, St. Michel, and Maissade. The other branch will be northward from Gonaives, passing Gros Morne, to Port de Paix, a northern coast city, about 35 miles distant. The entire system will cover an extent of about 321 miles. The contracts provide that the railway shall have first-class modern equipment, which will be purchased in the United States. The gage of the new line will be 3 ft. 6 in., and a shipment of 60-lb. rails has already been forwarded. Active construction work has progressed since early in 1911.

Railway Financial News.

Atlantic Northern & Southern.—George Adams, president of the Omaha & Iowa, bid $402,000 for the Atlantic Northern & Southern at the receivership sale on September 27. The money is payable to the court in ten days, if the court accepts the bid. The Atlantic Northern & Southern runs from Atlantic, Iowa, to Kimballton, and from Atlantic to Villiscala, a total of 54 miles.

Central of Georgia.—The income bondholders' protective committee is paying $45 per first income bond, $50 per second income bond and $14.58 per third income bond to holders of certificates of deposit of these bonds. The company declared the full 5 per cent. dividends on the first and second preference bonds, and $14.58 per third income bond, out of earnings for the fiscal year ended June 30, 1911. The $5 deducted from the payments to first income bondholders is for expenses of the committee, the second and third income bondholders having already paid assessments.

Chesapeake & Ohio.—Judge Landis, in the Circuit Court, has discharged the receiver of the Chicago, Cincinnati & Louisville. This property, which is now the Chicago line of the Chesapeake & Ohio, was sold under foreclosure in 1910 to the C. & O. of Indiana.

Chicago & Alton.—H. E. R. Wood, of Chicago, has been elected a director, succeeding George H. Ross.

Chicago, Rock Island & Pacific.—White, Weld & Co., New York, are offering $2,240,000 Rock Island Improvement Company 4½ per cent. series B guaranteed equipment trust certificates of 1905, and $1,575,000 guaranteed 4½ per cent. equipment trust certificates of 1905, both issues maturing semi-annually to 1915, at prices to yield 5 per cent. on the investment. These certificates are guaranteed principal and interest by the Chicago, Rock Island & Pacific Railway (the operating company). There were originally authorized $5,605,000 of the series B, of which $3,365,000 have matured and been paid and $4,500,000 of the second mentioned series, of which $2,925,000 have been paid. The two series of bonds now offered are secured on equipment originally costing $5,649,196, and $4,502,892 respectively.

The same bankers are offering $360,000 Chicago, Rock Island & Pacific Railway equipment trust 4½ per cent. series F bonds of August 1, 1911, maturing semi-annually from February 1, 1912, to August 1, 1926. These bonds are secured by equipment costing $400,252, and consisting of 24 sixty-foot steel postal cars, 11 seventy-foot steel baggage and mail cars, and six 40-ft. steel postal cars.

Detroit, Toledo & Ironton.—Sale of this property under foreclosure has been postponed from October 5 to January 9, on application of the trustee of the general lien and divisional 4 per cent. bonds.

Erie.—The New York Public Service Commission, Second district (state) has approved the issue and sale by the Erie of $4,550,000 3-year collateral notes at a price to be not less than 97. These notes are issued to refund the notes of the Erie & Jersey Railroad, and of the Genesee Railroad of June 1, 1907. These two companies were subsidiary companies which built the Guymard cut-off and the Genesee cut-off.

Kansas City, Mexico & Orient.—See an item in regard to this company in General News.

St. Louis Southwestern.—The directors were re-elected at a meeting of the board on October 3. R. Lancaster Williams, who had been associated with Frank Gould in asking for proxies in order to elect a representative of the minority stockholders to the board of directors, was not elected a director.

Southern Railway.—A semi-annual dividend of 1 per cent. has been declared, payable October 30, on the $60,000,000 5 per cent. non-cumulative preferred stock. In April, 1911, a dividend of 1 per cent. was declared, so that annual dividends in 1911 were at the rate of 2 per cent. From 1908 to 1910 inclusive no dividends were paid on the preferred stock; from 1902 to 1907 dividends were paid at the rate of 5 per cent. annually.